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THE MEDICAL TREATMENT OF PEPTIC ULCER

BY

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Ruthin Castle

PART I

We are often asked by doctors for an account of the medical treatment for peptic ulcer followed in this clinic, and particularly of the diet. The last description of our methods was published by my colleague, J. H. Anderson, in 1929. Perhaps the chief advances since then are a greater variation of the food and the checking of progress by more detailed radiology, especially with the strial pattern, and by knowledge gained with the gastroscope. It is now more generally accepted than in former days that to allay symptoms is only a first step; and that the thorough treatment which we have long advocated and practised is needed for permanent relief. The elements of physical and mental rest, diet, and medication are all of importance: their relative value differs with different patients, but failure of any one of the four may hinder or prevent smooth progress. Other aspects of the subject, such as the pathology, symptoms, diagnosis, complications, and statistics, are not here dealt with.

General Principles

In 1906, in St. George's Hospital, I started to feed by the mouth, from the beginning, patients with gastric ulcer, including those with haemorrhage. The method was modified from that of H. Lenhartz (1906) (Haberman, 1906). Recovery and nutrition were better, and pain, anaemia, and recurrence of haemorrhage less, than in control cases treated by the older method of abstinence from food, with rectal salines and nutrients. Also the patients were more comfortable, nursing was easier, and the parotitis and mild acidosis that may occur with fasting treatment were avoided (Spriggs, 1907–11; Langdon-Brown, 1908–9).

The regime is intended, by the use of fatty foods and absence of condiments, to excite but little flow of gastric juice; and by simple protein foods, and especially egg albumen, to combine with as much as possible of the hydrochloric acid secreted. The natural tendency to heal, which can be observed experimentally in simple ulcers, is thereby aided. Lenhartz held that, after bleeding, acid juice was more likely to digest a new clot than gentle stomach movement to dislodge it, and he reported that his method had reduced by half the recurrence of haemorrhage in the Eppendorf Hospital at Hamburg. Wirsing (1905) reported that a fall in acidity on the treatment was usual, though absent in some who did well. The advantage of putting food in the stomach is also supported by the observations of Hunter (1928–9), who found that unneutralized acid gastric juice delays clotting. The food is increased by daily or almost daily additions as regards both quantity and kind, so that the demands made upon the diseased organ are increased gradually. The caloric value rises fairly quickly in order to maintain nutrition.

While the original principles of rest, the nature of the first food, and the gradual increase are followed, the diet has become much modified by myself and my colleagues in the course of the years. A valuable addition was olive oil, suggested by Walko (1902) and Cohnheim (1904) and advocated by A. F. Hurst (1909–10) and myself (1910). All physicians are indebted to the work of their contemporaries, among whom in this subject should also be mentioned Bolton, Sippy, Ralph Brown, Eusterman (1938), Bastedo, M. J. Stewart, T. I. Bennett, and many others. Meulengracht (1933) has recently reaffirmed the principle of immediate feeding for ulcers, especially in cases with haemorrhage, and has set forth anew the arguments for, and the good results of, early feeding. The method is also supported by the observations of O. Christensen (1934) on the movements of the empty stomach.

The regime here described has therefore, with variations, been the basis of the treatment of my cases for some thirty-four years. Similar treatment has also been given successfully in cases of suspected early ulceration, duodenitis, and some forms of gastritis.

In 730 patients with peptic ulcers in this clinic the diagnosis has been established by suitable examinations, including radiographs and test meals; except that if there is haemorrhage a test meal is omitted and *x*-ray examination postponed. If septic foci are revealed their removal, when possible, is a preliminary measure. The patients were sent by doctors, and most of those in whom the diagnosis had been made before admission had already received treatment, while up and about, by careful diet, milk between meals, alkalis, and sometimes olive oil, many for long periods: others had rested in bed on the various diets and regimes in vogue.

The following is a general outline and not a fixed scheme. In practice it is modified for almost every patient; indeed, if there are diseases for which a diet can be fixed weeks or months ahead peptic ulcer in the early stage is not one of them. The regime cannot be followed safely in detail without medical supervision. Alteration may be needed according to: (1) the symptoms and signs; (2) the tolerance of milk, egg, olive oil, or other foods; (3) the tests for blood in the stools, for acetone, casts, and albumin in the urine, and for the degree of anaemia; and

(4) the general rate of progress. Especially in the early days should the patient be seen often. For these reasons management at home is not as safe and satisfactory as in the clinic, where there is an organization to carry out the regime by those familiar with it, and where tests or examinations can be made or repeated at any time. For many, also, mental relaxation is only possible away from home circumstances.

Rest in Bed

Longer experience has confirmed what was written thirty years ago in this *Journal*—namely, "that the most important point in the treatment of gastric ulcer is to ensure complete and prolonged rest in bed." . . . "Dietetic and medicinal treatment will relieve" out-patients and others who cannot, or do not, lie up, but will "seldom cure them." Whereas "cases in bed may be treated in many different ways with good results . . . the conclusion may be drawn that complete rest is a factor without which all other treatment is likely to be disappointing" (Spriggs, 1910; Hawksley, 1940).

The above statement does not disagree with the opinion of a recent writer (Ferriman, 1940), and of many others, that a careful regime of diet and medicine will do good even if the patient is up and about. And we know from scars seen at necropsies, at which a clinical history may be missing, that peptic ulcers have healed in cases in which an ulcer, if not unsuspected, was untreated. It may be assumed that these were of less severity; for the ulcers demonstrated during life heal slowly and imperfectly with inadequate care and treatment, and are apt to become chronic.

Most of our patients, therefore, are washed in bed in the first weeks and use the bed-pan; and when there has been a recent haemorrhage the patient should not move from the supine position for ten days. Milder cases with no occult blood in the stools may get up for bath and toilet; but even then we have the impression that those who are entirely in bed for the first month do better. Restless and nervous patients often learn repose, a lesson of much value for their future health. The suggestion, however, that rest in bed, with a plain diet, is the only treatment needed is contrary to our experience. The muscles of the limbs and back are stimulated during the time in bed by regular massage, the faradic current, and simple limb movements.

Medicines

A neutralizing powder is usually given three times a day after food, with a mechanical sedative such as bismuth, or in some cases before food. We have no doubt that bismuth is helpful, and have mainly used teaspoonful doses in milk or water of a "triplex" powder containing equal parts of oxychloride of bismuth, citrate of soda, and light carbonate of magnesia. If the bowels are loose the magnesia is replaced in part or altogether by precipitated chalk, or increased if there is constipation. A powder of the tribasic phosphates of calcium or magnesium may also be used, varying the proportions as above according to the activity of the bowels; it is more gritty than the triplex powder.

If the patient is watched daily alkalosis is rare. Any suggestion of it, such as a headache, malaise, depression, or drowsiness, especially if confirmed by albumin, blood, or casts in the urine and a rise in the non-protein nitrogen in the blood, is allayed by omitting the powder and giving plenty of fluid. We have not needed to give the rectal injections of 2 to 10 oz. of 2 per cent. ammonium chloride (Ellis, 1923–4) which have been found effective in severe cases. Indeed, no such condition causing anxiety has so far arisen in the hundreds that we have treated. Even mild tetany, such as is seen in coeliac disease, has not occurred apart from obstructive vomiting, and there has been no case of coma. The patients we see with alkalosis usually arrive in that state as a result of taking alkaline powder at home without medical supervision, and especially after repeated vomiting. They are dehydrated, with an excess of alkali and lowered chloride in the blood (Nicol, 1940). The urine may be acid. Such a recent patient, who needed surgery, still had an N.P.N. index of 70 after several days' treatment. A partial gastrectomy was undertaken with some hesitation, but no untoward symptom developed.

In other cases we use aluminium hydrate, 5 to 10 grains; or aluminium hydrate, 10 grains, magnesium trisilicate 20 grains, kaolin 30 grains—dose half to one teaspoonful; or some proprietary preparation. Aluminium hydrate is not alkaline; indeed, a saturated solution is neutral to litmus. It has, however, a power of counteracting acid which, though less than that of the usual alkaline powders, is still considerable. On occasion, in cases of great superacidity, an aluminium preparation has been given before and an alkaline powder after a meal. Pains are sometimes relieved by atropine 1/200 to 1/150 grain, either under the tongue or dissolved in a teaspoonful of water. This may be given at bedtime.

When there is anaemia iron is prescribed, sometimes at once, at other times about the end of the first week. We use a soft iron pill containing sulphate of iron, 150 grains; calcined magnesia, 20 grains; glycerin, 60 grains. This is made into sixty pills, two or more of which are taken twice a day after food. These pills are almost always well borne.

Sedatives such as bromide or sodium gardenal are useful for restlessness and insomnia, especially in patients with mental worries not yet solved.

Control of Quantity of Food

In Ruthin Castle the food is weighed or measured in order that the amount may be increased by regular steps. Grammes and cubic centimetres are employed, as easier and more accurate in use than ounces. In the following diet tables the ounces are given to the nearest convenient figure.

With a spring balance food can be weighed quickly on a hot or cold plate and a movable dial allows for the weight of the plate. The "dietary scale" made by Messrs. G. Salter and Co., West Bromwich, is satisfactory, and is marked with both grammes and ounces. For fluids, such as milk, there are glass measures marked for ounces or cubic centimetres.

Diet for First Six Days

The first food is an egg-and-milk mixture consisting of one egg stirred up in 3½ oz. or 100 c.cm. of milk, given alternately with olive oil.

In the dietary lists given below the first figure after each food is ounces (1 oz. equals about 30 grammes of solid or two tablespoonfuls of fluid). The second figure (in parentheses) is grammes or, for fluids, cubic centimetres.

1st Day.—Olive oil 1/2 oz. (15 c.cm.) at 8, 11, 2, 5, 8, and 10. (770 calories.)

2nd Day.—At 11 and 5 the olive oil is replaced by 1 (30) of the egg-and-milk mixture. (570 calories.)

A little milk or citrated milk is given in the night if patient is awake. A warm milky drink often helps sleep. The patient is encouraged to sip the milky foods slowly, so

as to keep a little in the stomach most of the time. The mouth should be cleansed carefully after each feed.

3rd Day.—8 a.m.: Olive oil 1/2 (15). 9 a.m.: Egg and milk 1½ (50). 11 a.m.: Olive oil 1 (30). 12 noon: Egg and milk 1½ (50). 2 p.m.: Olive oil 1/2 (15). 3 p.m.: Egg and milk 1½ (50). 5 p.m.: Olive oil 1 (30). 6 p.m.: Egg and milk 1½ (50). 8 p.m.: Olive oil 1 (30). 9 p.m.: Egg and milk 1½ (50). 10 p.m.: Olive oil 1/2 (15). (About 1,800 calories.)

4th Day.—The feeds of egg and milk are increased to 2½ (75).

5th Day.—Egg and milk now 3½ (100) at each feed.

6th Day.—Omit olive oil at 8 a.m. Increase egg and milk to 5 (150) at each feed. (1,800 calories.)

The patient often becomes thirsty in the early days. He sips freely of alkaline water containing 30 grains of bicarbonate of soda to a pint, but does not drink more than an ounce or so at a time.

Some patients find olive oil distasteful at first and then take to it with benefit; most feel better at once. In rare cases it cannot be managed at all, and is replaced by a beaten-up egg or occasionally by a small dose of paraffin. Others do not like egg, and that has to be omitted. A few state that in no circumstances can they take milk, but are found to manage well one of the modifications to be mentioned. If, therefore, olive oil, egg, or plain milk, hot or cold, is for physical or psychological reasons not well borne, then one or more of the following milky foods may be given instead in gradually increasing quantities:

A mixture of three parts of milk, one of lime-water, and one of cream. Citrated milk (1 grain of sodium citrate to the ounce, roughly 1/3 teaspoonful to a pint, or a pinch to 100 c.cm.). Milk 3 parts and water 1 part, or more dilute. Milk 4 parts and lime-water 1 part. Powdered whole milk in water. Allenburys, Benger's, or similar milky food.

The times of feeds or medicaments are varied to suit the symptoms. If, for example, the egg–milk mixture, olive oil, or powder is found to relieve an intermittent discomfort, it is given when the discomfort arises. Nausea is not common. Vomiting is rare; should it continue the treatment is modified without delay.

In some *mild cases* in which there is evidence of duodenal irritation but not clear evidence of ulcer, or in which there is clinical and radiological evidence that an ulcer is healing, the diet of about the sixth day is given at once. Treatment in such cases would then be as follows:

Diet for First Six Days in Mild Cases.—Olive oil 1/2 (15) at 8, 11, 2, 5, and 8 and egg–milk mixture 5 (150), to be taken slowly in sips, at 9, 12, 3, 6, and 9.30. (About 1,400 calories.)

Diet from 6th to 11th Day

The diet is now increased a little every day or two. It is not possible to put down each change, but the following is a routine that is often successful. It is not a time-table to be kept to unless progress is continuous and uneventful.

Instead of egg and milk on the *seventh day* add 1 oz. (30 grammes) of well-boiled rice or rice cooked with milk and a teaspoonful of sugar, with 3½ oz. (100 c.cm.) of milk and water, three parts to one. If that is well borne, on the *eighth day* 2 oz. (60 grammes) of minced or pounded underdone chicken is given at noon with milk and water; and the rice (or macaroni or vermicelli) at 6 p.m. with milk and water.

9th Day.—Dry toast 2/3 (20), with butter, is added at noon.

10th Day.—An average diet is here given in full: 9 a.m.: Toast 1 (30); butter; an egg, lightly boiled; milk and water 3 (100). 11 a.m.: Olive oil 1 (30). 12 noon: Chicken, minced or pounded, 2 (60); milk and water 3 (100). 2 p.m.: Olive oil 1/2 (15). 3 p.m.: Egg and milk 5 (150). 5 p.m.: Olive oil 1 (30). 6 p.m.: Boiled rice 1 (30), sugar a teaspoonful (5); milk and water 3 (100). 8 p.m.: Olive oil 1/2 (15). 9 p.m.: Egg and milk 5 (150). (About 1,630 calories.)

From now on olive oil is given three times a day, an hour before meals, usually a powder afterwards, and frequently soft iron pills.

11th Day.—Noon: Steamed fish 1½ (45), with white sauce 1/2 (15); toast, butter, milk and water.

Extra feeds are continued in the night as before.

Condiments, Vitamins, and General Instructions

No pepper or mustard is used. It is better to do without salt, especially when there is an excess of acid in the stomach, as is common. The normal acid, though derived from the sodium chloride in the blood, persists until a late stage of experimental salt deprivation, and it is unlikely that small variations in the intake affect the degree of gastric acidity; but it is undesirable, as above mentioned, to make the food more tasty than is natural. If the lack of salt is intolerable—for example, with egg—the patient may take the minimum needed to savour it, but never any such quantity as might irritate the raw surface of the ulcer. No salt is used in cooking in the first month; after that a little, if the evidence of healing is satisfactory.

The diet tends to be deficient in vitamin C. There is some in milk, underdone meat, and potato. To many patients we give orange juice twice a day immediately after food. There are, however, cases in which discomfort or pain follows: neither does the more bland "blackcurrant crush" (1 oz. in water) recently advised suit all patients with ulcer. Ascorbic acid is now available in pleasant tablet form. I have not had enough experience of the clinical signs of its lack among these patients, or of benefit from its use, to write of its value. Vitamin B may also be taken in a tablet.

No *alcohol* is given. *Tobacco* is not advised. Later, when full meals are well borne, one cigarette after a meal is sometimes taken. It is clear from experimental evidence that the effect of moderate smoking on the secretion of hydrochloric acid varies in different people; it is better for most, probably all, to abstain.

The *bowels* may act naturally throughout. In any case they are not disturbed in the first few days. After that, if needed, an enema is given on alternate days or every third day during the time in bed. If motions are hard a teaspoonful or dessertspoonful or more of liquid paraffin is given night and morning. The magnesia in the powder may be increased as mentioned above, or when aluminium hydrate is used one dose daily may be replaced by cream of magnesia or by the *B.P. Codex* mist. magnes. hydrox. et paraff. liq. in doses of about a dessertspoonful.

As soon as solid food is added the patient is instructed to chew slowly and thoroughly. If gums or teeth are diseased they are treated. Deficient teeth are replaced as early as possible.

When the patient is comfortable and begins to feel returning energy it should be remembered that a person who is fairly well, even if in bed all day, may get tired, especially from talking, over-reading, and listening to the wireless. Full rest alone is therefore prescribed from 12 to 1, after lunch for an hour or so, and from 6 to 7 in the evening. Books and wireless are not advised at these times: if the patient becomes restless he may after half an hour take a newspaper or some light reading. Many people doze in the rest hours. Such a nap in the day, at all events before 3 o'clock, does not prevent, indeed often aids, sleep at night.

Diet from 12th to 16th Day

If symptoms have abated additions to the diet may now be made as follows:

12th Day.—7 p.m.: Brains, sweetbread, or tripe 2 (60) and toast 2/3 (20).

13th Day.—Noon: Minced mutton, underdone, 2 (60).

14th Day.—Noon: Milk pudding 1 (30).

15th Day.—Noon: Minced tender beef, underdone, 2 (60). 7 p.m.: Fish, not fried, 1½ (45), and custard 1½ (45).

16th Day.—7 p.m.: Macaroni or vermicelli 1¾ (50), with the minced meat.

Example of 16th Day.—8.30 a.m.: Lightly boiled egg; thin toast or bread (not new) 1 (30); butter; milk and water a tumblerful, 6 (170)—that is, milk 4 (110) with water 2 (60)—to be drunk slowly in sips. 11.30 a.m.: Olive oil 1 (30). 12 noon: Chicken 2 (60), roast or boiled; rice pudding 1 (30), with sugar one teaspoonful (5), or arrowroot or cornflour; thin toast or bread 2/3 (20) and butter; milk and water a tumblerful 6 (170). 2 p.m.: Egg and milk 5 (150). 4 p.m.: Thin bread-and-butter, without crusts, 2/3 (20); milk and water a tumblerful 6 (170). 6.30 p.m.: Olive oil 1 (30). 7 p.m.: Steamed fish 1½ (45), with white sauce a tablespoonful (15); macaroni, vermicelli, or spaghetti 1½ (45); custard 2½ (75), scrambled egg 1½ (45), or junket 3½ (100); toast or bread 2/3 (20), butter; milk and water a tumblerful 6 (170). 9 p.m.: Egg and milk 5 (150). (About 2,000 calories.)

Reconsideration if Symptoms Persist

With a short previous history pain usually ceases in four to five days. In more chronic cases it may persist much longer. If in about a fortnight the abdomen is distended and uncomfortable and the appetite flags a return for a day or more to one of the fluid stages is made. An enema may give relief. Should the symptoms not be allayed the diagnosis and treatment are reconsidered. When gastritis and disease of other organs, especially the gall-bladder or appendix, can be excluded, the possibility of a local complication or of neoplasm is always in mind. If there is suspicion of growth the abdomen is explored. Otherwise another *x*-ray examination is made in four or even three weeks. Nowadays the gastroscope (Schindler, 1940) is invaluable for the diagnosis from other lesions in the stomach and sometimes in the pylorus.

Diet from 17th Day to End of Month

All being well, increases in food may be made as follows:

17th Day.—Noon: A dessertspoonful of plain light mashed potato; mutton or beef 2 (60).

18th Day.—Breakfast: Fish 2½ (75) instead of egg.

19th Day.—Noon: A tablespoonful of mashed potato 1½ (45).

20th Day.—7 p.m.: Macaroni 2½ (75).

21st Day.—8 p.m.: Bread-and-butter, four pieces, or dry toast 2/3 (20).

Example 21st Day.—8.30 a.m.: Steamed or grilled fish 2½ (75) or boiled egg; toast or bread 1 (30), butter; milk and water 6 (170). 11.30 a.m.: Olive oil 1 (30). 12 noon: Minced or tender mutton, boiled or roast, or tender underdone minced beef or chicken 2 (60); mashed potato 1½ (45); rice pudding 1 (30); sugar a teaspoonful (5); toast or bread 2/3 (20), butter; milk and water 6 (170), to be drunk slowly. 2 p.m.: Egg and milk 5 (150). 4 p.m.: Toast or bread 1 (30) with butter, or bread-and-butter 1½ (45), without crusts; milk and water 6 (170). 6.30 p.m.: Olive oil 1 (30). 7 p.m.: Fish cream 2 (60) without seasoning, steamed or grilled fish 1½ (45) with white sauce 1/2 (15); macaroni, spaghetti, or vermicelli 2½ (75); custard 2½ (75) or scrambled egg 1½ (45) or junket 3½ (100); toast or bread 2/3 (20), butter; milk and water 6 (170). 9 p.m.: Egg and milk 6 (170) or fish cooked in batter (leaving the fried batter) 1½ (45). (About 2,300 calories.)

The Following Week.—Whole milk with breakfast and tea. At breakfast: also porridge, from fine oatmeal, 3½ (100) and cream 1½ (45). During morning: egg and milk replaced by milk 6 (170) and a rusk or plain biscuit. At midday meal: sweetbread, calf's head, brains, or tripe are alternatives. At tea: sponge cake 2/3 (20). At 9 p.m.: Benger's food or milk 7 (200).

Diet at End of 4th Week: Full Diet for Healing Ulcer

Breakfast.—Porridge 3½ (100) with cream 1½ (45); fish 2½ (75), fried or grilled, or cold fat bacon or ham 2/3 (20), or egg (poached, boiled, or scrambled); toast or bread 1 (30), butter; milk 6 (170).

10.30 a.m.—Milk a large tumblerful 8 (220), with a rusk or biscuit; the milk to be drunk slowly.

12.30 p.m.—Olive oil 1 (30).

Midday Meal.—Tender mutton (roast or boiled), tripe, sweetbread, calf's head, brains, chicken, or tender cut of beef 2 (60); plain mashed potato 2½ (75); milk pudding 2½ (75), sugar a teaspoonful (5); toast or bread 1 (30), butter; milk 3 (90).

4 p.m.—Toast or bread 1 (30) with butter 1/2 (15), or bread and butter 1½ (45), without crusts; sponge or Madeira cake 2/3 (20); milk 6 (170).

6.30. p.m.—Olive oil 1 (30).

Evening Meal.—Fish 1½ (45), baked, grilled, or fried (leaving any hard outside pieces), with white sauce 1/2 (15); macaroni, spaghetti, or vermicelli 2½ (75), with butter if desired; milk pudding or custard 3 (90) or junket 3½ (100); toast or bread 1 (30), butter; milk 3 (90).

10 p.m.—Milk 8 (220) or Benger's food 7 (200), and a rusk or plain biscuit.

This diet yields about 2,900 calories, and is a full diet for a large person or a young man who is not taking exercise. The average patient will take smaller quantities.

(A bibliography will be given at the end of Part II)

[*To be concluded*]

Dr. Angus MacNiven in his annual report as physician-superintendent of the Glasgow Royal Mental Hospital states that the conclusions formed by himself and his colleagues from their experience of the use of somnifaine, insulin, and cardiazol therapy are that insulin and cardiazol are safer forms of treatment than somnifaine, which has no therapeutic advantages over insulin or cardiazol. "Cardiazol appears to hasten recovery in the more benign types of mental illness, but it is doubtful whether it produces recovery in cases which, if given time, would not recover spontaneously. It does not produce recovery in the malignant types of dementia praecox, and although it may produce improvement in chronic cases of dementia praecox, in our experience this improvement is almost always transitory. Therapeutic results are always unpredictable, and even in benign types of illness when recovery appears to have taken place a relapse may occur. All these types of treatment have the serious disadvantage that they are unpleasant to the patient, particularly cardiazol, the administration of which causes acute anxiety preceding the convulsion which is sometimes almost intolerable." Dr. MacNiven criticizes these treatments on the grounds that they are not founded on accumulated knowledge of the nature of mental disease and its causation, and he hopes that their use may not lead to a neglect of the study of each case as an individual psycho-biological reaction, which can only be understood and treated in terms of the patient's situation and total personality.

SURGICAL WAR EXPERIENCES

BY

AXEL ODELBERG *

(From Finnish Ambulances I and II of the Swedish Red Cross. Chiefs: Professor G. Nyström and A. Odelberg)

The following notes suffer from several defects and must be regarded only as the expression of my purely personal views. They are based on so brief a period of work as two and a half months, during which, faced as I was with inappropriate housing for the purpose and with a staff unaccustomed to team-work, the problem of establishing a satisfactory serviceable hospital occupied a great deal of my time. Moreover, they relate entirely to the severe winter conditions in Northern Scandinavia. On certain points, especially where there was not complete agreement, I have made use of my Finnish colleagues' experiences. I did not myself take part in the work of the hospitals in the most advanced positions, but only in those which correspond to our Swedish divisional and base hospitals.

Situation of the Field Hospitals

Perhaps the most striking feature is that the hospital services were situated relatively far in the rear. On the sectors of the front where I was on duty the field hospital was usually thirty-five to forty kilometres or more behind the front line, and the formations corresponding to base hospitals a further 100 kilometres beyond that. The reason for this, of course, was, first, that there was no actual "front" except that near the roads, while the patrols moved freely about over large tracts of country; and, secondly, that the network of roads was rather scanty. The result of this was that with regard to both staff and equipment the hospital worked under conditions much more like those in peacetime than was hitherto thought possible. V.A.D.s and "lottas" were extensively employed, and the female personnel was thus just as numerous as in peacetime, perhaps even more so. It has often been pointed out that provision for war casualties is primarily a transport problem, and this is undoubtedly true. Given an adequate supply of transport, however, I think that the problem has been solved very satisfactorily by converting traffic omnibuses into hospital ambulances. Nevertheless it cannot be emphasized too strongly that a standardization of the stretcher apparatus is absolutely necessary. It ought never to happen that a wounded person cannot be carried on the same stretcher all the way from the front line to the place where he is to be taken care of. The Swedish army stretcher is extraordinarily good in almost every respect. It might perhaps be a little broader and have handles which can be dropped downwards. A good many observations relating to the construction of the motor-cars and their equipment in winter-time might be added, but they are perhaps more of interest to another class of reader.

The work itself varies enormously in intensity. At times the radiological and surgical departments are employed ceaselessly day and night, while at other times there may be only two or three cases of a trivial kind a day. These fluctuations are equalized to some extent in the hospital wards, but not very appreciably. In view of this I believe that the hospitals should not be staffed with the full complement of doctors from the outset, but with a standard personnel which under greater pressure could be augmented from a reserve of doctors located a short distance away. The system of separating the operating theatres from the wards, with special doctors for the latter, is not satisfactory. War injuries require that the doctors who operate should be responsible for the subsequent care of the patient, at any rate during the first few days. It is desirable that each hospital unit should have at its disposal a skilful electrotechnician as well as a technical expert in radiology. It is very difficult to manage without such when one has to install and repair radiological apparatus and reserve lighting under primitive conditions, or replace lost and defective parts of sterilization plants and innumerable other things. The services of dentists ought not to be dispensed with either, and it is advisable to have physicians on the staff, because at times the field hospitals are very largely filled with more or less banal cases of "common colds." A number of purely "civil" complaints, particularly digestive diseases and sciatica, are very apt to occur on active service.

A very difficult problem, at any rate with our present form of building, is to arrange that the staff gets adequate rest. The casualty transports arrive fairly late at night and the work goes on continuously. In the day-time there is often one air raid warning after another, with or without bombing. For example, one of our field hospitals was bombarded six times in the course of a week; large bombs burst close to it and heavy frozen lumps of earth were projected through the roof of a ward. One day there were eight air raid warnings, so that the staff and ambulant patients spent the greater part of the daylight hours in the shelter. The entire work of the hospital was badly disorganized. The food was spoiled, and the meals had to be served whenever possible. The all-important factor for the healing of the wounds—namely, rest—was completely in abeyance. The mental composure of some of the patients, especially those in bed, as well as of the staff, was gradually disturbed, so that true fear psychosis occurred. My experience is that as a moral support it is essential to leave one nurse in each ward and one doctor for about every three wards during an air raid warning. All the rest would go to the shelter.

Treatment of Wounds

As regards wound treatment, the following is perhaps to a great extent a repetition of what has often been pointed out during recent years.

An *x*-ray examination of almost every case is necessary. The ideal method is excision (and suture). In the majority of cases it can be adopted even after the first twelve hours. It is usually not an easy operation: it demands technical skill, anatomical knowledge, and speed on the part of the operator. Skin, subcutaneous tissue, and fascia can be cut out in one mass, with one opening of the wound. Then comes the conscientious and really arduous operation of removing all foreign bodies or the tissue contaminated by them in the depths of the wound, and all tissue which is not definitely viable. The larger nerves and vessels, tendons, and, if possible, the not completely free bone splinters are avoided. Every pocket and corner of the wound must be explored. Then the other opening of the wound is dealt with in the same way. The result should be a completely clean and dry wound with great loss of tissue, and the problem now is the treatment. In case of uncertainty it is best to fill the wound with fish-liver-oil ointment and apply a supporting bandage, preferably a plaster one. If the operation is regarded as satisfactory the wound should be sutured. I have employed a few large deep adaptation stitches, but have dispensed with sunken sutures and drainage. I have had no experiences which would induce me to alter these rules. A gauze drain is undoubtedly

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to be condemned, for, since albumin coagulation occurs in its meshes, it only acts as a plug. Rubber tubes, at least in a few cases, have appeared to be the cause of threatened secondary haemorrhage through rupture of a vessel. A small rubber drainage tube for twenty-four or at most forty-eight hours is, however, quite permissible and appropriate. Suture is out of the question when the wound is old or much torn; recourse is then had to ointment and fixation bandages.

If one has to deal with retained missiles, whether grenade splinter or gun projectile, it is often best to remove the foreign body by an operation through sound tissue. I have not hesitated to close such an incision primarily and in layers. It has happened, however, that the sutures had to be removed later on account of suppuration of the wound. Gunshot tracks and wound sinuses could not, as a rule, be thoroughly excised (for example, in patients shot through the pelvis with the bullet in the opposite hip region, or wounded through the chest with shell splinters in the supraclavicular fossa, or through the face with splinters in the neck muscles, etc.). They were left open, with an ointment bandage, often after excision of the mouth of the wound. *Small* splinters in anatomically harmless regions or in situations which are very difficult to reach—for example, deep down in the liver, in the lung hilum, or in the pelvic connective tissue—must be left, so long as they do not cause local symptoms of an alarming nature. The shot-wound openings are left to heal "under the scab." Bullets from rifles and automatic weapons, as has often been pointed out, are far less dangerous than shell and bomb fragments from the point of view of infection, and form an exception to the above strict mode of procedure. I have only very exceptionally made use of sunken sutures. Tension on the sutures must always be avoided, and a haematoma must never be left untreated. Attention has already been drawn to the advantage to the patient of being under the supervision of the same surgeon for the first few days, and this cannot be emphasized too much. If this cannot be done—should it, for example, be necessary to transport him at once to the rear—then it is better not to suture the wound at all, but merely to excise and immobilize it. Exceptions to this rule are, of course, the recognized triad: penetrating shot wound of the skull; penetrating shot wound of a joint; and open pneumothorax, which ought to be closed at once and with precision.

With the limited experience I have had it is hardly worth while discussing injuries to the various parts of the body. I should only like to point out that clean shot wounds right through the chest, and those in which small fragments are retained, heal surprisingly well under a purely conservative expectant treatment even if there is extensive subcutaneous emphysema. It is also quite exceptional that a haemothorax needs to be punctured and drawn off more than once. In these cases particularly I have the purely subjective unverified impression that routine treatment with sulphonamide preparations is of value. Another set of cases, in which a number of temperature curves seem to give definite support to the view that the conception of the effect of these preparations obtained in peacetime surgery is the right one, are the septic ones with swinging temperature. It may happen that a late-appearing—for example, week-old—suppurating wound with foreign body and sequestrum has been operated upon and left open, in conjunction with which sulphonamide has been used for some days, but it still remains septic. A fresh application of sulphonamide after ten to fourteen days is not uncommonly followed by a critical and permanent fall in temperature.

There are also a bewildering number of symptoms arising from the vegetative nervous system in connexion with shot wounds of the extremities. A peripheral rise or fall in temperature, hyperidrosis, erythralgia, localized oedema, and severe attacks of pain are common findings. Some of them disappear quickly, others persist for a long time. The whole of this interesting subject really deserves a thorough investigation, when the material can be elaborated.

Frostbite and Burns

Apart from shot wounds I think that two kinds of common war injuries ought to be briefly mentioned—namely, frostbite, and burns from certain types of incendiary bombs. In accordance with old custom the treatment of local frostbite is always the same: the patient—who is usually placed in the open air or in a cold room—has the affected part of his body rubbed with snow and afterwards immersed in cold water. More than ten years' experience at Boden and Östersund has shown me the danger of this theoretically ill-founded treatment and the damage actually caused by it.

The frostbitten patient should be put in a warm room and, if possible, given a warm drink. Then the benumbed limb should be pinched and massaged *from* the centre *towards* the periphery and rubbed with a dry coarse towel; but always great care must be taken that the skin is not damaged but follows in the movement. As soon as the circulation has been restored movement is made further towards the periphery; directly a joint is passed it should be subjected to slight passive movement, but without force. These passive movements should soon be replaced by active ones. In this way the affected part is systematically dealt with. The use of snow or water at this stage leads to maceration of the skin, with danger of infection and gangrene. Alternate hot and cold baths, however, are useful in the after-treatment. Frost blisters are best left to themselves without bandaging, whereby the healing takes place in a moist sterile chamber. Deeper frostbites can with advantage be treated with tannic acid or, if they become infected, with fish-liver-oil ointment and fixation.

Besides the usual electron and thermite incendiary bombs the Russians employed large incendiary bombs filled with a greyish-brown mass of probably crude petroleum (massuth), which, at any rate at low temperature, had the consistency of vaselin. By detonation this substance is set alight and sprayed over a wide area. Its action on living objects is dreadful. Uncovered parts of the body receive extensive deep third-degree burns, but it also causes an apparently chemical erosion, similar to that found in alkali injuries. Extensive oedema, with the face swollen to two or three times its natural size, is also characteristic. The combustion gases produce a picture not unlike corrosive bronchitis. Cough, pain in the chest, superficial rapid breathing, and aphonia occur soon after the injury. If the pulse rate becomes rapid or cyanosis gives way to pallor the prognosis is very bad indeed, and death occurs with the picture of increasing respiratory failure. Otherwise the symptoms usually disappear slowly in the course of some weeks. The treatment consists, above all, in rest, which, however, is extremely difficult to ensure, because the patients are among those most affected by the terror of air attacks. At the sound of an air raid warning many of them, consumed with unutterable fear, jump out of bed, throw at most a blanket over their shoulders, and rush into the open, away from hospital and shelter, even in extremely cold weather. Sulphonamide preparations are generally used, and venesection is performed for cyanosis. Morphine is avoided where contraindicated, but cannot be dispensed with, for the patients' pain is too severe and their terror too great. Barbituric acid preparations, even in large doses, are unable to induce the much-needed rest. These patients are perhaps the most trying of all to the doctor. They are so entirely dominated by their sense of fear that it is

impossible to obtain the necessary psychic contact with them. The local lesions are best treated by tannic acid coagulation, of which I have no personal experience, because all the cases I saw had had different kinds of ointment applied before admission.

General Treatment

Rest, warmth, and fluids are the all-important factors in the general treatment of war injuries. What has been written above shows how difficult it is to ensure adequate rest for the patients. Warmth, and fluid in the form of a warm sweet drink, should be supplied at once as a routine measure to all patients except those with abdominal wounds. Injections of intravenous glucose drops should be given before and during the operation to all patients suffering from shock, as well as to all those who are suspected of being on the verge of a state of shock. The injections should be continued for some days.

The form of narcosis most often used was an intravenous injection of narcotal, following an injection of 4 c.cm. of 20 per cent. magnesium sulphate solution and 2 cg. of morphine. Even greatly affected patients have stood this form of narcosis remarkably well. The amounts injected are small. This narcotic remedy is perhaps as suitable for shock patients as it is for elderly people. A post-operative state of excitability has been observed. Ethocaine applied locally has been largely used. It seems, however, as if these highly exhausted and nerve-racked people are not so well adapted to local anaesthesia, at least during the first twelve hours. They often evince distinct reactions to pain on insertion of the needle, and it is difficult to obtain a satisfactory anaesthesia. The reaction is of course normal again after rest and sleep.

After-treatment

The view that the work of the surgeon is only half done when the patient leaves the operating table has gained more and more ground. The planning and supervision of the after-treatment is a difficult art. I am myself a convinced supporter of the view that everything possible should be done at the operation to give Nature a free field in which to exert her own bactericidal and healing powers. Afterwards one factor dominates all the others: namely, rest—immobilization. Well-applied supporting plaster bandages, metal splints, or extension apparatus encompassing a sufficient number of joints are the best forms of treatment for this purpose. Next in importance is to avoid changing the bandages. The conditions under which I had to work, and the time at my disposal, made it impossible to carry out both these requirements. When the language question put obstacles in the way of the important personal contact between doctor and patient it was more difficult than usual to make the patient understand that his discomfort was caused by the injury and not by the bandaging; and, in particular, the surgical appliances which confined the patient to bed and thus forced him to stay in the ward during an air raid alarm were far from popular. Here the surgeon had to capitulate in the presence of powerful psychic factors; it would presumably have been possible to conquer even these in the course of time. It was still more difficult to obviate the changing of bandages. In the native hospitals and policlinics of one of the districts where I worked the bandages were changed daily, and even very trifling injuries were heavily bandaged. And when one is convinced, by the peacetime treatment of accidents—and war surgery is indeed nothing but the care of exceptionally severe and unusually numerous accidents—of the advantages which the open treatment of certain cases and the closed treatment in plaster and with fish-liver-oil ointment of others offer, it is extremely difficult to give way to local prejudice. It turned out, however, that it was not possible to assert one's authority in the face of solid opposition on the part of both patients and native nurses. Only gradually and by choosing appropriate cases could a change in the desired direction be accomplished. A large turban-like bandage was, however, when I departed, still much more popular than a small piece of adhesive plaster or mastisol bandage, which would have been quite sufficient. Hostile air activity and numerous deep-rooted psychic causes have thus prevented me from obtaining a clear picture of the right lines to follow in the after-treatment of war wounds; but I am convinced on the whole that the methods indicated above—often attributed to Böhler and Löhr—give the best and quickest results.

Summary

A report is given of personal impressions and experiences after two and a half months' work at the divisional and base hospitals in Finland. On account of the mobility of the front these hospitals had to be transferred at least thirty to forty kilometres further back, with the result that they could be run more on a peacetime basis. The transport problem was solved by using converted traffic omnibuses. Standardized stretcher apparatus was found to be absolutely necessary.

The hospital work varied greatly in intensity, and it is suggested that when the pressure is at its height the staff should be augmented by doctors from the reserve.

Each hospital unit should have at its disposal a technical engineer, a dentist, a physician, etc.

The repeated air raid alarms interfere with the work of the hospital and disturb the rest of personnel and patients, and also cause fear psychosis: one field hospital was bombed six times in a week.

The treatment of wounds consists in excision (plus suture); when there were great loss of tissue and doubt as to treatment the wound was filled with fish-liver-oil ointment and a supporting bandage applied. Large deep adaptation stitches were employed for suturing the wounds. Small rubber drainage tubes proved to be suitable. Old mutilated wounds were treated with ointment and fixation bandages. Foreign bodies were removed by an operation through sound tissue (with primary suture). Clean shot wounds right through the chest were successfully given conservative treatment: these cases and the septic ones with swinging temperature seem to react well to sulphonamide.

The manifold symptoms arising from the vegetative nervous system in shot wounds of the extremities deserve further investigation.

Frostbites were treated with massage towards the periphery, followed later by alternate hot and cold baths, and in severe cases with tannic acid, but, if infected, with fish-liver oil and fixation.

Besides the usual electron and thermite incendiary bombs the Russians used large incendiary bombs probably filled with crude petroleum; these caused third-degree burns and chemical erosions on the naked skin. The combustion gases produced a lesion resembling corrosive bronchitis. These patients are very difficult to treat on account of their sense of fear. The form of narcosis most often used was an intravenous injection of narcotal, but local anaesthesia was unsuitable for these highly exhausted patients.

Surgical appliances which made it difficult for the patients to take refuge in the air raid shelters were very unpopular.

I should not like to conclude this short review without expressing the gratitude we all feel towards our Finnish colleagues, both to those in whose areas of control we worked

and to our young comrades who, in the capacity of liaison officers, have been responsible for contact and have had to bear the brunt of the "paper" war. We have enjoyed far more than ordinary loyalty and comradeship. All things possible have been done to smoothe the way for us. These friends, who were worn out by hard work and sorely tried by personal grief, have by sacrificing much-needed time for rest and recreation not only carried out our wishes but even tried to forestall them.

THE RATIONALE OF COMPLETE IMMOBILIZATION IN TREATMENT OF INFECTED WOUNDS

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With the prospect of thousands of casualties arising in the near future from gunshot wounds and from bomb splinters it becomes a matter of urgency to review the methods at present advocated for their treatment. If one may judge from articles in recent numbers of our medical journals it would appear that surgeons with extensive experience of the treatment of injuries during the last war are still recommending those methods which they considered most satisfactory in 1918. Some reference may be found to the fact that a new method based on the work of Winnett-Orr has been employed by the surgeons of the Republican side during the Spanish Civil War.

It is the purpose of this review to summarize the available literature dealing with the spread of infection in the body, particularly in the limbs, and to show that a good case based on experimental work may be made out for the closed-plaster method of treating infected wounds. The essential feature of this method, which has been fully described by Trueta (1939a), is the complete immobilization of the soft tissues. The experience gained from its use in the treatment of large numbers of infected wounds has shown that under conditions of complete immobilization the tissues of the body are capable of resisting invasion by many different varieties of bacteria, even when the latter continue to grow freely in the wound. Later, when the initial danger of invasion has been overcome, the cells and body fluids are capable of destroying these organisms and allowing the normal processes of repair to take place.

From the outset it must be emphasized that the aim of this form of treatment is to provide the optimal conditions for the body itself to destroy the invaders, and no attempt is made to kill them by external agents: this consideration is paramount, irrespective of the possible virulence of the organisms that might be present. It is obvious that if the common pyogenic bacteria (but perhaps not organisms that normally remain fixed and damage the host by the production of a powerful exotoxin) can be kept localized in the tissues their power to injure the host is very much diminished.

Experimental Evidence

Movement of Bacteria in the Body.—It has long been known that bacteria can travel very rapidly from recent wounds to the internal organs; indeed, non-pathogenic bacteria have been found in the spleen five minutes after being placed in wounds on the backs of rabbits (Schimmelbusch, 1894). This rapid spread must mean that organisms enter either the blood stream or the lymph stream. It is difficult to imagine them entering directly through the cut ends of the smaller vessels; either these would be blocked by thrombi or, if still patent, the current of the escaping fluid should prevent particles being carried in. The bacteria must penetrate the walls of the blood or lymph capillaries. Pawlowsky (1900) was convinced that bacteria travelled by the lymphatics. In support of this it has been found that bacteria injected into the knee-joints of rabbits may be isolated from the inguinal, iliac, and lumbar lymph glands within ten minutes of the injection. It also indicates that the glands do not invariably act as efficient filters for the organisms (Noetzel, 1906). Three varieties of bacteria injected under the skin on the backs of rabbits have been cultured from the lymph obtained from the thoracic duct at a time when cultures of the blood were sterile (Finucci, 1935). Wells and Johnstone (1907) showed that *B. coli* injected into the peritoneal cavity of dogs appeared in large numbers in the lymph from the thoracic duct; in rabbits they found that *B. coli* placed in the peritoneal cavity reached the blood stream after a longer interval, and in smaller numbers if the thoracic duct had been tied. Similarly, virulent bacteria placed in the nasal cavities of rabbits can be isolated from the lymph removed by a cannula from the cervical lymph duct (Schulz, Warren, and Drinker, 1938). The exact mechanism by which the bacteria reach the lymph is not clear. Although lymph draining an inflamed area may contain large numbers of polymorphonuclear leucocytes (Menkin, 1929), virulent capsulated bacteria that are not phagocytosed may readily enter the lymph stream (Field, Schaffer, Enders, and Drinker, 1937).

Absorption of Substances from the Tissues.—Absorption is carried out by both the blood and lymph streams; the amounts removed by each are dependent upon the size of the molecules of the substance being absorbed. Those of low molecular weight are absorbed by the blood stream alone; as the molecular weight rises so does an increasing proportion get carried away by the lymphatics (Drinker and Field, 1933). Substances of a molecular weight equal to that of serum proteins are absorbed entirely by the lymphatics. This has been shown to be the case both for subcutaneous tissues (Lewis, 1921) and for joints (Bauer, Short, and Bennett, 1933). Since this is the chief channel of absorption for protein particles of relatively small size it is not surprising to find that microscopically visible particulate matter travels entirely by the lymphatics and not by the blood stream. This, for instance, has been shown to be the case in studies on the absorption from joints (Bauer, Ropes, and Waine, 1940).

Importance of the Lymph Stream.—It is obvious that any measure that will reduce the amount of lymph flowing through a limb must at the same time greatly decrease the chances of absorption of bacteria and their toxic products. It is well known that the amount of lymph draining from a limb can be varied within very wide limits by relatively simple means. Thus it is impossible to obtain any lymph from the leg of an animal at rest; it begins to flow as soon as the limb is moved or massaged. Recent work has shown that both the amount of lymph produced and the rate at which it flows can be greatly increased by active or passive movements, by warmth, and by massage

(White, Field, and Drinker, 1933; McMaster, 1937). Furthermore, this increased lymphatic flow is associated with an increase in the speed of movement of particles and colloidal substances through the tissues (Florey, 1927; Allen, 1935; Bauer, Ropes, and Waine, 1940).

Application of this Knowledge

(*a*) *Freshly Inflicted Wounds.*—It is clear that in a limb completely immobilized the flow of lymph will be greatly slowed or perhaps completely arrested; as a result bacteria and their toxins will have reduced opportunities of reaching the general circulation. It also follows that immobilization should be instituted before the bacteria have had time to multiply, but must on no account be done before a thorough excision of the dead tissues has been carried out. The immobilization must be complete and include putting the muscles at rest. It is quite inadequate to immobilize the joint alone, for this will not prevent muscle spasm whenever the limb is disturbed, and muscular movements are most important in the production of a brisk lymph flow.

(*b*) *Wounds of Over 12 Hours' Duration.*—In wounds that have been present for twelve hours or more inflammatory changes will be present. It has been shown by many workers that if inflammatory changes are brought about in tissues by the injection of irritants bacteria when introduced tend to remain arrested at the site of injection and diffuse out either slowly or not at all. This has been shown to be the case in the peritoneum (Issaeff, 1893), in the knee-joint (Pawlowsky, 1909), and in the skin (Menkin, 1931). The mechanism of this so-called fixation is obscure; at all events it does not present an absolute barrier to the passage of substances through it. Field, Drinker, and White (1932) showed that dye was fixed in the inflamed paw of a dog and did not appear in the lymph flowing from the limb in spite of the fact that a great deal more lymph was being produced than from the undamaged limb. However, if the paw was moved or squeezed dye rapidly appeared in the lymph. This increased flow of lymph from an inflamed area means that should anything succeed in penetrating the fixation barrier it will stand a greater chance of being carried away. It follows that complete immobilization of an inflamed wound will reduce the chances of bacteria passing out of the inflamed area into the general circulation.

(*c*) *Healing Wounds.*—In still older wounds a layer of granulation tissue will be formed, and this is known to be impermeable to many different varieties of bacteria, including, for instance, streptococci (Halley, Chesney, and Dresel, 1927). But in order that this granulation tissue should be able to resist bacterial penetration it must present an unbroken surface. Everyone knows that the removal of dressings invariably abrades the raw area, and creates numerous tiny wounds each of which is capable of allowing the ingress of bacteria. By dressing the wound as infrequently as possible the granulation tissue is left undisturbed to act as a most effective barrier against invading bacteria. These conditions are satisfied when the closed-plaster technique is employed and the wound is left undisturbed for days or even weeks at a time. The validity of these contentions is borne out in practice by the following observations made in the course of the treatment of large numbers of cases during the Spanish Civil War.

1. Streptococcal septicaemia, which was the commonest cause of death among the wounded during the last war (Colebrook, 1939), was rarely observed in cases treated by this method. This is the more remarkable since in the majority of the cases streptococci could be grown from the discharges coming from the wounds.

2. Patients with extensive wounds invariably developed some pyrexia for a day or two after a change of plaster. This indicated that absorption of bacteria or of their toxins had resulted from the disturbance of the wound.

3. When the plaster was removed the granulation tissue always had a bright red healthy appearance, indicating that an active healing process was going on even in the presence of large numbers of bacteria.

Discussion

Hitherto in the treatment of infected wounds the efforts of surgeons have mainly been directed towards the use of antiseptics for the purpose of destroying bacteria. Far too little attention has been paid to the natural powers of the tissues to localize and kill bacteria.

In spite of an immense amount of work by chemists and bacteriologists there has yet to appear the ideal antiseptic for local application to the tissues that will destroy the bacteria and leave the tissues undamaged: even if this ideal antiseptic were found its application would result in frequent disturbances of the injured part.

The method of treating infected wounds in a closed plaster cast appears to offer a solution to the problem, and is based on entirely different principles. The essential features are a preliminary cleansing of the wound, preferably by soap and water, followed by a thorough excision of all dead tissues or of those whose survival seems doubtful; adequate drainage is ensured by opening up all the deeper tissues. There must be no opportunity left for the development of tension in the intermuscular spaces, the retention of discharges, and a consequently increased chance of absorption. It is absolutely essential that the surgical treatment should be thorough, and when the limb is finally enclosed in plaster this should be of sufficient extent to give complete immobilization to all the soft tissues. Under these conditions it is no longer necessary to worry about the growth of bacteria in these wounds, for the healthy tissue underneath presents an absolute barrier to their entry into the general circulation.

It seems probable that the secret of success in the use of this method lies in the complete immobilization of the injured and infected part. In all methods involving the continual use of antiseptics the wound is disturbed at intervals for the change of dressings. Even if the limb is supported on some open splint the pain caused by the manipulations will give rise to muscle spasm; also, the change of dressings damages the growing surface of the granulation tissue.

Conclusion

No new observations have been brought forward in this article, but an attempt has been made to explain the striking success of a relatively new method of treating infected wounds.

The methods described elsewhere (Trueta, 1939b) may not be perfect, but it is felt most strongly that improvement will only follow if the outlook of surgeons is fundamentally altered. Their aim should be to make sure they are giving the injured tissues the very best conditions to enable them to destroy the bacteria, and at the same time they should avoid damage to the cells by the application of antiseptics.

The perfect antiseptic may prove as elusive as the Philosopher's Stone, and until it is found it seems best to

leave the task of destroying bacteria to the human body, which in the performance of its normal functions kills enormous numbers every day.

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TRANSFUSION OF FRESH AND STORED BLOOD*

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The object of the present investigation was to obtain information on: (1) the relative therapeutic value in cases of acute and non-acute haemorrhage of transfusions with fresh and stored blood; (2) the relative incidence and character of reactions following the use of fresh blood and stored blood.

Clinical Material used in the Investigation

Many clinicians in the hospitals in the four depot areas collaborated in this investigation by referring cases requiring blood transfusions to the clinical observers attached to the four depots. The general treatment, which was under the direction of the physician or surgeon in charge of the case, was not confined to blood transfusion. This meant that, in many instances, in addition to the transfusion of test material the patient was given saline, glucose saline, or iron and other therapy, which rather confused the picture. For our purpose cases have been divided into three groups:

(i) Acute haemorrhage (considerable blood loss within twenty-four hours of administration).

(ii) Non-acute haemorrhage (simple blood loss at least twenty-four hours before the transfusion or repeated haemorrhages over a long period).

(iii) Miscellaneous—which includes cases of haemorrhage complicated by gross sepsis, obscure anaemias, and patients subsequently found to have some complicating condition, such as leukaemia or malignant disease. Whether a patient were given fresh or stored blood depended on a number of factors. In a few cases the physician or surgeon in charge was insistent that fresh blood should be used. In some instances, analysed in detail, patients were given a transfusion of fresh blood followed after an interval by stored blood, or vice versa.

To obtain uniformity in the presentation of essential facts the clinical observers were asked to furnish particulars concerning each case transfused. The important points in the analysis of the information are presented in the tables which follow.

All blood used was obtained from the four depots. Two parts of blood were added to one part of diluent, consisting of 3% glucose in 0.85% sodium chloride and 1.05% sodium citrate. *Fresh blood* we defined as blood that had been stored for less than twenty-four hours; *stored blood* as blood that had been kept from ten to fourteen days. Blood was given by the Medical Research Council apparatus, except in a few instances when hospitals preferred to use their own.

Method of Examination

A. Clinical.—The difficulty of obtaining an objective measure of improvement or lack of improvement in a series of cases seen by different observers was appreciated from the outset. Improvements in pulse and blood pressure are a valuable indication in patients with shock and acute haemorrhage, but are less important with non-acute haemorrhage. An attempt has been made to assess various factors such as improvement in colour and general well-being and mental attitude under the term "general improvement."

B. Pathological: Red Cells and Haemoglobin.—A rise in the number of red cells and the haemoglobin level might be expected to offer a measure of satisfactory haematological response. Red cell counts and haemoglobin estimations were therefore made whenever possible. In the accompanying tables an increase in haemoglobin has been expressed not as an absolute figure but in relation to the amount of blood given. The observed gain has been divided by the number of bottles administered; the figures shown therefore represent the gain per bottle, each bottle containing 360 c.cm. of whole blood—approximately two-thirds of a pint. Haemoglobin was always estimated by Haldane's method. Before accepting the results it is important to realize there are possible difficulties in their interpretation.

Errors of the Method: 1. Colorimetric Error.—Any colorimetric method of estimation is open to error. In practice in one laboratory it has been found that technicians practised in using the Haldane standard will usually estimate any sample of blood within 2% of one another. It was felt that such sources of error were equally present in all cases. Therefore if a significant rise in haemoglobin was found in one group of cases and not in another it might be accepted as an indication of greater improvement in the former. Since haemoglobin usually runs parallel with the red cell counts and haematocrit readings in the type of cases under consideration the two latter have not been tabulated, though they were noted in making the analysis.

2. Normal Daily Variation.—Several observers have shown that in a normal person the haemoglobin may vary by as much as 8% in twenty-four hours: small individual variations are therefore probably without significance.

3. Blood-volume Changes.—In a patient with acute haemorrhage rapid changes in blood volume take place. There is no satisfactory method of estimating blood volume, especially in patients who are acutely ill. The influence of such changes on the circulating haemoglobin cannot therefore be estimated. An apparent fall in haemoglobin immediately following transfusion may be due only to blood dilution or to a persistence of bleeding. In acute cases haemoglobin estimations were therefore felt to be of little value between case and case, but probably were of some significance where two large groups, one receiving fresh blood and the other stored blood, were compared.

4. Raised Plasma Bilirubin.—Following the use of stored blood there may be a rise of plasma bilirubin in the first twenty-four

* Preliminary report on their relative values made for the Blood Transfusion Research Subcommittee and the Committee on Traumatic Shock of the Medical Research Council.

hours. This in some cases may be high enough to make accurate estimation of the haemoglobin difficult.

What Constitutes a Reaction ?

What can be considered a reaction following a transfusion is a matter of dispute. Since many of the acute cases studied might have been expected to have a rise of temperature, irrespective of whether they had had a transfusion or not, such a rise cannot necessarily be considered significant. In the miscellaneous cases fever was often present before the transfusion was given. A rise in temperature has therefore not been included among reactions but has been analysed separately. Severe headache, rigors, vomiting, sudden pain in the head, back, or loins, jaundice, haemoglobinuria, and urticaria during or immediately following transfusion have been taken as an indication of an untoward reaction, even though of a temporary nature. It has been generally accepted in this country that blood should be warmed to approximately body temperature before administration, and that reactions are more frequent when blood is given cold. We sometimes brought the blood to body temperature by standing it in water at 40° C. for fifteen to twenty minutes before administration, it reaching a patient at a temperature of 31° C. In other instances the blood was given without warming, and reached the patient between 8° and 15° C., depending upon how long it had been standing at room temperature after removal from the ice-box. The incidence of reactions in cases receiving warmed and those receiving cold blood has been analysed in an attempt to determine whether the temperature of the blood is important.

The distribution of the 153 cases to which this study relates is given in Table I: 58 were given fresh blood and 95 stored blood.

TABLE I.—*Number of Cases Transfused by Different Means*

Type of Case	Fresh Blood			Stored Blood		
	Warm	Cold	Total	Warm	Cold	Total
Acute haemorrhage	17	3	20	20	12	32
Non-acute haemorrhage	16	6	22	20	14	34
Miscellaneous ..	7	5	12	10	10	20
Miscellaneous included for reaction only	3	1	4	6	3	9
Total	43	15	58	56	39	95

Clinical Improvement Shown

The degree of improvement is analysed in detail in Table II. There appears to be no significant difference in this respect between the three groups of cases given fresh and stored blood. For instance, general improvement was reported in 90% of the 20 cases of acute haemorrhage given fresh blood and in 81% of the 32 given stored blood. In the non-acute haemorrhage cases it was reported in 77% of 22 patients given fresh blood and in 71% of the 34 given stored blood—again a negligible difference. In the group of miscellaneous cases a larger proportion showing general improvement lay in the stored blood group, but the numbers involved in the fresh blood group are so small that no stress can be laid upon this difference. Finally, adding the three type groups together shows that 104, or three-quarters of the total 140 cases, showed a general improvement in condition after transfusion, with an equal relative frequency in the fresh and stored blood groups (74% and 76%). Similarly, there is no significant difference between the numbers reporting subjective improvement (44% of patients given fresh blood and 36% of patients given stored blood).

Blood-pressure and Pulse-rate Changes

These are variable, both with fresh and with stored blood; but, considering the smallness of the group, the frequency of the different changes is observed with remarkable equality. In the patients with acute haemorrhage given fresh blood the blood pressure fell by 10 or more mm. Hg in 10%, rose by that amount in 60%, and showed no material change in 30%. In the similar cases given stored blood it fell also in 10%, rose in 58%, and showed no change in 32%. In the cases of non-acute haemorrhage the corresponding figures are: for fresh blood, 19% fell, 33% rose, and 48% remained stationary; and for stored blood, 19% fell, 31% rose, and 50% remained stationary. (Only 7 observations are available for the 12 patients in the miscellaneous group given fresh blood, so comparison here is useless.) The pulse changes are less uniform, though in each group a fall was rather more often observed with stored blood. The differences are, however, not great: of the 51 patients transfused with fresh blood the rate fell in 31%, rose in 16%, and showed no material change in 53%; of the 85 patients given stored blood it fell in 43%, rose in 12%, and showed no change in 45%. The differences are clearly very small and might easily be due to chance. (It may be noted that these totals include, both for the fresh and the stored blood groups, nearly exactly the same proportions of patients in the three type classifications—acute, non-acute, and miscellaneous—so that for broad comparative purposes their addition is justified.)

Haemoglobin Changes

For the purposes of comparison readings were taken at approximately twenty-four hours, forty-eight hours, and on the fifth to seventh day after transfusion (Table III). The numbers available are very small, and with both fresh and stored blood the degree of change observed varies widely from case to case, as would be expected. Conclusions can therefore be only tentatively drawn. It is clear that at each of the three points of time stored blood often gave quite as good a result in this respect as fresh blood. On the other hand, in both the acute and the chronic haemorrhage groups rather more patients gave a relatively poor response after stored blood than after fresh blood. For instance, if a rise of 6% or more per bottle administered be taken arbitrarily as a "good" response we get the following results. Of non-acute haemorrhage cases given fresh blood 50% (5 out of 10) gave a good response at twenty-four hours, 90% (9 out of 10) at forty-eight hours, and 92% (11 out of 12) at five to seven

TABLE II.—*Effects of Fresh and Stored Blood. Clinical Improvement*

Type of Case and Type of Blood Given	Total Cases	Average Amount of Blood Given, in Bottles	No. of Cases showing General Improvement	No. of Observations Made	No. of Cases showing Subjective Improvement	Pulse					Blood Pressure			
						Rate down 10 or more Beats per Minute	Rate up 10 or more Beats per Minute	Stationary (within 10 Beats per Minute of Original Figure)	Tension Volume Improved	Not Noted	Down 10 or more mm. Hg	Up 10 or more mm. Hg	Stationary (within 10 mm. of Original Figure)	Not Noted
Acute haemorrhage (Fresh ..	20	2.2	18		10	9	2	9	1		2	12	6	
Acute haemorrhage (Stored ..	32	1.9	26		9	19	7	5	1*	1	3	18	10	1
Non-acute haemorrhage (Fresh ..	22	2.1	17		12	5	4	12		1	4	7	10	1
Non-acute haemorrhage (Stored ..	34	1.9	24		16	12	2	20			5	8	13	8
Miscellaneous (Fresh ..	12	1.7	4	1	2	2	2	6		2		3	4	5
Miscellaneous (Stored ..	20	1.8	15		6	6	1	13	2*		5	5	10	

* This entry also appears in the group where rate is increased.

TABLE III.—*The Change in Haemoglobin Level Expressed as the Absolute Rise of Haemoglobin % Divided by the Number of Bottles of Blood Administered*

Type of Case and Type of Blood	Haemoglobin % at 24 Hours							Haemoglobin % at 48 Hours							Haemoglobin % at 5–7 Days						
	Fall	Stationary	Rise					Fall	Stationary	Rise					Fall	Stationary	Rise				
			0–3	3–6	6–9	9–12	12–15+			0–3	3–6	6–9	9–12	12–15+			0–3	3–6	6–9	9–12	12–15+
Acute haemorrhage { Fresh	2		2	1	3	1	1	1		2	2	1	2	2	1		1	1	2		1
Acute haemorrhage { Stored	8	1	2	4	1		1	7		2	2	1		1	9	1	4	3	2		
Non-acute haemorrhage { Fresh	1		1	3	2	1	2			1		3	5	1				1	5	3	3
Non-acute haemorrhage { Stored	3	1	2	6	6	1				2	4	6	1	2				7	7	1	2
Miscellaneous { Fresh		1	1	4	2						2	1	1			1		3			1
Miscellaneous { Stored			2	4	1	1				1	7	3	1	1	1	1		7	1		1

days. The figures for non-acute haemorrhage cases given stored blood are 37% (7 out of 19) at twenty-four hours, 60% (9 out of 15) at forty-eight hours, and 59% (10 out of 17) at five to seven days. Each proportion is slightly lower in the stored blood group. The corresponding percentages for the acute haemorrhage groups are: fresh blood 50 at each point of time, stored blood 12, 15, and 19 (again it must be noted that the basic numbers are very small). With the miscellaneous cases there is, however, no difference between fresh and stored blood, the percentages giving a "good" reaction, being 25, 50, and 20 for the former and 25, 38, and 18 for the latter.

With the number of observations available the differences between the fresh and the stored blood cases in the acute and non-acute haemorrhage groups are not, according to the statistical test, more than might easily occur by chance. The appropriate conclusion therefore seems to be that in many cases stored blood will certainly give a rise in the haemoglobin level as great as that produced in comparable cases by fresh blood; but more extensive figures than those available here will be necessary before it can be said whether it is as effective in all cases. Further, it may again be stressed that, especially in acute haemorrhage, a fall in haemoglobin may be due to dilution associated with clinical improvement. Therefore too much importance should not be attached to the divergent readings found in the small groups of acute cases given fresh and stored blood. Finally, 10 cases were available which had been given transfusions of equal amounts of fresh and stored blood, and in which there were no gross complicating factors. In 1 the haemoglobin response to fresh and stored blood was the same; in 6 there was a greater rise in haemoglobin with fresh blood; while in 3 the response to stored blood was the greater (Table IV).

TABLE IV.—*Patients receiving Transfusions of both Fresh and Stored Blood*

Case No.*	Fresh Blood			Interval (days)	Stored Blood	
	Hb Change†	Days after	Reaction		Hb Change	Reaction
1 A	7	7	0	7		
B					7	0
2 A	7	7	0	8		
B					13	Slight
3 A				7	6	Slight
B				7	−4	0
C	4	7	Slight	7		
D	4		0	7		
4 A				8	7	0
B	9	7	0			
5 A	7	24 hours	0			
B				6	4	0
6 A				7	11	0
B	10	7	0			
7 A	9	24 hours	0	7		
B					5	0
8 A				7	1	0
B	5	7	0			
9 A				6	4	+
B	10	48 hours	0			
10 A	5	24 hours	0	24 hours	—	
B					7	0

* Letters A, B, C, D indicate the number and order of transfusions given to any one case.
† Expressed as the absolute rise of haemoglobin % divided by the number of bottles of blood administered.

Reactions Observed

The number of reactions observed with fresh and stored blood is given in Table V: even a mild rigor or serious headache has been included. In no case was a really serious reaction with jaundice and haemoglobinuria noted. Two cases of transient jaundice occurred in patients with advanced carcinoma and one in a patient who had had a hysterectomy three days previously.

The proportions of patients showing reactions in the different groups are given in Tables V and VI. Division into sub-

TABLE V.—*Analysis of Reactions with Fresh and Stored Blood*

Type of Case and Type of Blood Given	Total Cases	Total Cases with Reactions	Rigor +	Rigor ++	Rigor +++	Vomit	Pain in Back or Head	Jaundice	Urticaria
Acute haemorrhage:									
Fresh, warm	17	1	1						
,, cold	3	0							
Stored, warm	20	4	3					1*	
,, cold	12	2	1		1				
Non-acute haemorrhage:									
Fresh, warm	16	1							1
,, cold	6	1				1	1		
Stored, warm	20	3	2			1	1		
,, cold	14	8	1	2	2	2	2		4
Miscellaneous:									
Fresh, warm	7	2		2					
,, cold	5	1		1					
Stored, warm	10	3	2	1					
,, cold	10	5	2	2		1	1	2*	1
Miscellaneous reactions only:									
Fresh, warm	3	0							
,, cold	1	0							
Stored, warm	6	3	1	2					
,, cold	3	3	1	1	1				

* Slight transitory.

groups by type of case and type of transfusion—fresh, stored, warm, or cold—results, of course, in very small numbers, so that the levels of the percentages must be interpreted cautiously. It is noticeable, however, that in each of the six comparisons between fresh and stored blood there is a higher rate of reactions in the latter. As the relative numbers of cases of the different groups treated with fresh and stored blood are approximately the same there is no fallacy in comparing the rates based upon the totals. They are as follows: With fresh warm blood the reaction rate was 9%, and with stored warm blood 23%; with fresh cold blood the rate was 13%, and with stored cold blood 46%. Taken alone neither difference is more than might be expected to occur by chance in such small samples, but as this difference was consistently observed in all the groups studied by type of case the excess in the stored blood groups is statistically significant. It will be seen that 31 reactions were recorded in the stored blood groups: if in each of the six subgroups in Table VI the rates for the corresponding fresh blood groups had prevailed there should have been 10. On the other hand, whether warming the blood is of advantage it is, on the available figures, difficult to say. With fresh blood there is an insignificant difference between the two reaction rates in the totals (9% and 13%) and no pronounced difference in any of the small subgroups. With stored blood there is a considerable difference in the totals (23% and 46%), to the disadvantage of cold blood; this is statistically significant. In one of the three subgroups (the acute haemorrhages) there is, however, no material difference. There is an indication, it may be concluded, that warming the blood is likely to reduce the number of reactions, but on these figures it is hardly more than an indication. (It may be noted that a consider-

TABLE VI.—*Total Reactions in Relation to Type of Blood*

Type of Case and Type of Blood		Cases	Reactions	Per cent.
Acute haemorrhage	Fresh, warm	17	1	6
	„ cold	3	0	0
	Stored, warm	20	4	20
	„ cold	12	2	17
Non-acute haemorrhage	Fresh, warm	16	1	6
	„ cold	6	1	17
	Stored, warm	20	3	15
	„ cold	14	8	57
Miscellaneous	Fresh, warm	10	2	20
	„ cold	6	1	17
	Stored, warm	16	6	38
	„ cold	13	8	62
Total	Fresh, warm	43	4	9
	„ cold	15	2	13
	Stored, warm	56	13	23
	„ cold	39	18	46

ably larger proportion of the patients given stored blood had it cold: the addition of the warm and cold groups for comparison of the reactions produced by fresh and stored bloods would therefore be open to objection, and has been avoided.) If attention be confined to severe reactions—i.e., patients who had rigors + + or rigors + + + (Table VII)—clearly no appre-

TABLE VII.—*Severe Reactions (Rigors + +, Rigors + + +) in Relation to Type of Blood*

Type of Blood	Total Cases	No. of Reactions
Fresh, warm	43	2
„ cold	15	1
Stored, warm	56	3
„ cold	39	9

ciable difference is revealed between fresh warm blood, fresh cold blood, and warm stored blood. The reaction rates are all low—namely, 4.7, 6.7, and 5.4%. The only high rate is with stored blood administered cold—namely, 23.1%—and the experience is too small for much confidence to be placed in this observation.

It may be concluded, therefore, that severe reactions were no more frequent with warm stored blood than with warm fresh blood. Cold stored blood showed to some disadvantage, but further observations are needed to substantiate the case. Very minor reactions were, however, more often observed with stored blood, warm or cold, than with the corresponding fresh blood. There is no evidence that these reactions were the result of other differences between the groups of patients. The patients were fairly equally divided into the different type groups, their age and sex distribution were very similar, the amount of blood given was equivalent, and closely similar proportions were said to be improving, stationary, or deteriorating in clinical condition at the time of transfusion. The only difference observed was that in the group of patients given stored cold blood rather *more* were "group-to-group" transfusions than in the other groups. This might have been expected to reduce their reaction rate relatively. In the group of 10 patients who had transfusions of both fresh and stored blood at different dates two had a slight reaction following stored blood but not following fresh blood, while one had slight reactions following both fresh and stored blood.

Temperature Rise

An attempt was made to analyse the changes in temperature noted, since a rise is usually thought to indicate an unfavourable reaction to transfusion. Owing to complicating factors, such as pre-existent sepsis, associated operative intervention, or internal haemorrhage, the results are not easy to interpret except in chronic haemorrhage. In these cases observation of temperature was made in 15 instances with warm fresh blood and in 16 with warm stored blood (Table VIII). There was some rise of temperature in 7 patients in the former group and in 8 in the latter. A rise of 3° F. or more was observed in 3 instances in each group. Of 6 similar patients to whom cold fresh blood was given there was a temperature rise in 3, and in 14 given cold stored blood there was a rise in 7. (Relatively rather more instances of a considerable rise occurred in the latter group, but the numbers are too small

TABLE VIII.—*Observations of Temperatures following Transfusion (up to 12 Hours after End of Transfusion)*

Type of Case and Type of Blood	Total Cases	Rise by 1° F.	2° F.	3° F.	4° F.	5° F.	Stationary	Not Recorded	Associated Reactions
Acute haemorrhage*:									
Fresh, warm	17	1	1	2	0	0	8	5	1
„ cold	3	0	0	1	0	0	2	0	0
Stored, warm	20	3	2	1	0	0	8	6	4
„ cold	12	0	2	1	1	0	3	5	2
Non-acute haemorrhage:									
Fresh, warm	16	2	2	1	0	2	8(c)	1	1
„ cold	6	1	2	0	0	0	3	0	1
Stored, warm	20	3	2 (a) (c)	2	0	1	8(b)	4(c)	3
„ cold	14	2	0	5	0	0	7	0	8
Miscellaneous:									
Fresh, warm	7	0	1	0	0	1	4	1	2
„ cold	5	0	1†	0	0	0	4	0	1
Stored, warm	10	0	3†	1†	0	0	4	2	3
„ cold	10	3†	0	0	1	1†	5	0	5

* In every case where there was an appreciable rise of temperature this might have been accounted for by the patient's original condition—*e.g.*, haematemesis and post-operative conditions.
† Pyrexial beforehand.
(a) Some other cause for pyrexia.
(b) Temperature recorded immediately afterwards but not again during 12 hours following.
(c) Temperature taken during transfusion but not in 12 hours following.

for any stress to be laid upon this.) Accepting a rise of any magnitude as evidence of a reaction, there is clearly no difference between the four groups of patients with non-acute haemorrhage. There appears to be equally little difference between the cases of acute haemorrhage in which warm fresh or warm stored blood was administered. In the former there was a rise in 4 out of 12 cases, and in the latter 6 out of 14. The numbers of observations in the groups given cold blood are too few to be informative, as are also those relating to the miscellaneous cases (Table VIII). In several instances the increased temperatures might well be due to other factors, and no certain conclusions can be drawn.

Relation of Quantity of Blood given to Reaction Rate

It was thought that the reaction rate might be related to the amount of blood administered or to the rate of administration. An analysis was therefore made of the data available on both these points. The figures of reactions observed in relation to the amount of blood administered are given in Table IX. The numbers in each of the sub-

TABLE IX.—*Reactions related to Number of Bottles Administered*

Type of Case and Type of Blood	Total Cases	R	1 Bottle Cases	1 Bottle R.	2 Bottles Cases	2 Bottles R.	3 Bottles Cases	3 Bottles R.	4 Bottles Cases	4 Bottles R.
Acute haemorrhage:										
Fresh, warm	17	1	4	0	10	1	1	0	2	0
„ cold	3	0	0		3	0	0		0	
Stored, warm	20	4	10	3	6	1	2	0	2	0
„ cold	12	2	4	0	7	2	1	0	0	
Non-acute haemorrhage:										
Fresh, warm	16	1	6	1	4	0	4	0	2	0
„ cold	6	1	0		4	1	2	0	0	
Stored, warm	20	3	3	0	13	2	2	0	2	1
„ cold	14	8	2	1	12	7	0		0	
Miscellaneous:										
Fresh, warm	7	2	2	0	4	2	1	0	0	
„ cold	5	1	2	0	3	1	0		0	
Stored, warm	10	3	3	0	6	2	0		1	1
„ cold	10	5	4	2	5	2	0		1	1

R = Reactions.

groups of this table are so very small that some method of summation is essential to discover whether the amount of blood administered bears any relation to the number of reactions recorded. For instance, in the acute haemorrhage cases given warm stored blood 4 of the 20 patients had some kind of reaction. If the amount of blood given does not influence the chance of a reaction occurring, then, with a sufficiently large number of observations, one-fifth of the patients given one pint would be expected

to show a reaction, one-fifth of those given two pints, and so on. The figure for the total would, in other words, be derived equally from each of the groups given different amounts. Therefore in the instance quoted the number of reactions expected would be one-fifth of the 4 given either three or four pints, or 2, 1.2, and 0.8 "patients" with reactions. Actually the numbers of patients with reactions in these subgroups were 3, 1, and 0. The comparison of these observed numbers with those expected on the assumption that the amount of blood given does not influence the reaction rate at all cannot unfortunately show whether the assumption is likely to be false or not. The experience is far too small. It is, however, possible to get the corresponding expected numbers of reactions on the same hypothesis for each of the groups of Table IXA—for the six different groups defined by diagnosis and type of blood administered. The addition of all these small expected numbers, none of which is large enough to be informative by itself, is then legitimate and will give the total number of reactions that might have been expected to occur in the patients given different amounts of blood, using throughout the hypothesis that the amount of blood given is not a factor in the occurrence of reactions. If that hypothesis is false then the total observed numbers of reactions in the patients given one pint, two, three, or four pints will differ significantly from the numbers calculated on the basis of it, as follows:

TABLE IXA

	1 Bottle	2 Bottles	3 or 4 Bottles	Total
Total No. of cases given different amounts of blood ..	40	77	23	140
Observed No. of reactions ..	7	21	3	31
Expected No. of reactions on assumption of no connexion between amount of blood given and occurrence of reactions	9	19	3	31

The observed distribution of reactions differs insignificantly from the expected, and it may be concluded that these observations reveal no association between the amount of blood given and the risk of a reaction occurring.

Relation of Rate of Administration to Reaction Rate

A similar calculation based on figures shown in Table X, where reactions are related to rate of administration per bottle, gives the following results (Table XA) (excluding one unspecified case). The sequence of such differences as are observed with these small numbers does not suggest any close association between rate of administration and occurrence of reactions. It must, however, be stressed that the experience is really insufficient to give decisive answers to these questions.

TABLE XA

	Under ¼ hour	¼–1 hour	1–1½ hours	1½–2 hours	2 hours or more	Total
Total No. of cases receiving blood at given rates ..	29	33	26	12	39	139
Observed No. of reactions	3	14	5	3	5	30
Expected No. of reactions on assumption of no connexion between rate of administration and occurrence of reactions ..	4	9	6	3	8	30

Summary and Conclusions

A study has been made of the effect of fresh and stored blood in cases in which the clinicians in charge considered that blood transfusion was indicated.

The six clinical observers attached to the four blood depots who were engaged in this investigation are unanimously agreed from a consideration of the clinical results that stored blood is as good as fresh blood in the treatment of acute haemorrhage. They are not so certain that stored blood is as valuable as fresh blood in the treatment of non-acute haemorrhage, but at the same time the available data present no evidence that stored blood is in fact of less value to such cases.

Analysis of the figures regarding gain in haemoglobin shows that in many cases stored blood will certainly give a rise in haemoglobin as great as that produced by fresh blood, but on the average in both the acute and non-acute haemorrhage cases the gain was greater with fresh than with stored blood. (In the miscellaneous cases no difference in the average gain was noted.) More extensive figures than those available here will be necessary before any final conclusion can be reached.

Mild reactions, excluding rises in temperature, occurred more commonly following stored than following fresh blood. The numbers of severe rigors observed after the use of warm fresh and stored blood were practically identical (4.7% and 5.4%).

In a total of 153 cases analysed in this investigation no severe haemolytic reactions were found and no fatal result attributable to transfusion occurred.

With regard to rise in temperature following transfusion, cases of non-acute haemorrhage are the most informative and, though the scale of the experience is small, these reveal no material difference between fresh and stored blood administered either warm or cold.

From a study of the occurrence of reactions it is considered that there is an advantage in warming the blood to approximately 37° C. before administration.

Analysis of the figures available reveals no association between either the amount of blood given and the risk

TABLE X.—*Reactions Related to Rate of Administration per Bottle*

Type of Case and Type of Blood		Total Cases	R	Rate of Administration in Hours															
				0–¼		¼–½		½–1		1–1½		1½–2		2–3		Over 3		Rate not Recorded	
				No.	R	No.	R	No.	R	No.	R	No.	R	No.	R	No.	R	No.	R
Acute haemorrhage	Fresh, warm	17	1	2	1	5	0	5	0	3	0	0		1	0	1	0		
	,, cold..	3	0	0		0		0		3	0	0		0		0			
	Stored, warm	20	4	2	0	4	1	5	2	3	0	1	0	2	0	3	1		
	,, cold	12	2	0		0		3	1	4	1	1	0	2	0	2	0		
Chronic haemorrhage	Fresh, warm	16	1	1	0	4	0	5	1	2	0	0		2	0	2	0		
	,, cold..	6	1	1	0	0		1	0	1	0	1	1	2	0	0			
	Stored, warm	20	3	2	1	2	0	3	1	2	0	3	0	2	0	6	1		
	,, cold	14	8	0		0		6	5	4	2	1	1	2	0	1	0		
Miscellaneous	Fresh, warm	7	2	1	0	1	0	0		1	0	1	0	0		2	1	1	1
	,, cold..	5	1	1	0	0		0		1	1	1	0	2	0	0			
	Stored, warm	10	3	0		2	0	1	1	0	1	1	1	2	0	4	1		
	,, cold	10	5	0		1	0	4	3	2	1	2	0	1	1	0			

R = Reactions.

of reactions or the rate of administration and the risk of reactions. The experience is, however, insufficient to give a decisive answer.

The clinical observations were made on behalf of the Medical Research Council by Drs. Helen Brown, A. C. Dornhorst, G. W. Hayward, D. H. G. MacQuaide, P. L. Mollison, N. Whittaker. The observers were well aware that in the literature similar observations have been recorded on many of the points raised in the present report; they have, however, made no attempt to correlate these with their own findings. They wish to express their thanks to the staffs of hospitals in the London Sectors who placed clinical material at their disposal, and to Dr. Bradford Hill for his help in the statistical analysis of the data collected.

HYPERTONIC SODIUM SULPHATE: PRACTICAL APPLICATIONS

BY

J. C. LYTH, M.B., B.S.Lond.

My experience of the use of sodium sulphate as a hypertonic agent for wounds was first published in 1935.[1] In 1939, with war imminent, I appealed[2] for a trial of this method. In February, 1940,[3] I recorded the results of this treatment alone in over 1,000 consecutive cases, with experiments and suggestions to explain its success.

It is now generally admitted that bactericidal antiseptics do more harm to the body tissues and leucocytes than they do to invading germs. The need is urgent for a ready and effective way of treating large numbers of infected wounds. I feel, therefore, that the following brief summary of the practical applications of this method may not be out of place.

Details of the Method

The Principle.—The surface of an infected wound is kept in contact with material soaked (and kept soaked) with the strongest tolerable solution of the optimal osmotic and diffusive agent available. For this purpose no other hypertonic agent hitherto used approaches sodium sulphate in efficiency; but other relatively feeble agents in use, with varying degrees of appreciation of the true nature of their reactions, are Epsom salts, common salt, Dakin's solution, urea, insulin, partially evaporated pus, saliva, and sweat.

The Solution.—To make a saturated solution of sodium sulphate (Glauber's salt) place a quantity (say 2 lb.) of the salt in a Winchester, fill up with cold reasonably sterile water, and shake. Add more water as the solution is used, so long as undissolved crystals remain. Do not dilute.

The Medium.—This may be of any material which will hold the solution—plain lint, or cotton-wool if cavities are deep and irregular. Loose particles of wool will not adhere.

The Covering.—This should consist of elastoplast wherever practicable; otherwise oiled silk or grease-proof paper and bandage will do. Clean shallow fresh wounds will heal under a bandage alone.

Method of Application: (a) Fresh Clean Wounds, Non-penetrating.—Do not wash with water or antiseptic. Bathe gently with the solution. Soak the material in the solution, apply to the wound, and cover completely with elastoplast. Leave the dressing twenty-four hours or longer if there is no pain, fever, or discharge. Before removing, soak the material with the solution. If no suppuration or inflammation occurs, repeat the dressing and leave for a further period; if septic, treat as below.

(b) Penetrating, Dirty, or Already Septic Wounds.—Remove obvious foreign bodies, but avoid disturbing exposed tissues—particles of dirt will work out later. Bathe with solution and apply dressing and elastoplast as above. Avoid unnecessary changes of dressing, but *apply more solution at frequent intervals* (hourly if necessary) by turning back a corner of the covering, or through an elastoplast-covered window.

Never hesitate to apply this treatment, however deep the wound or minute the breach of surface. Two important accessories are, first, elevation by means of a sling for the arm and bed or a foot-rest for the leg; secondly, immobilization, using splinting or plaster when necessary.

Difficulties that Arise

Types of Injury.—In cuts requiring suture primary healing is invariable if dressing soaked in solution is applied over the stitches. If foreign bodies cannot be removed, treat as for penetrating wounds: septic inflammation may be prevented until removal later. Septic inflammation after tannic acid treatment of burns and scalds is immediately relieved, and large burns heal well under continuous application. No hesitation need be felt in using sulphonamide chemotherapy as well. Since the series published (Lyth, 1940) I have treated numerous cases with sulphonamides and with sulphapyridine along with this method without ill effect. Exception may be made in jaw injuries (see below).

Localities.—In the case of orifices and cavities (for example, nostril, external auditory meatus, axilla, interdigital hollows of hand or foot, orbits) pack with wool kept soaked with solution. The cornea tolerates the saturated solution, which can also be used in an eye bath. A simple way of covering the fingers and toes with elastoplast is to run a two-inch strip from base over tip and down to base, press the sides together, and cut off superfluous edges, making an adhesive finger-stall. For maxillo-facial injuries treat an external penetrating wound as above. Where the mouth is affected a specialist surgeon told me he is trying to arrange a form of irrigation which will avoid the swallowing of solution. I doubt whether sulphonamide drugs could be used concomitantly in jaw injuries.

Conclusion

First-aid posts and casualty clearing hospitals throughout Britain are now going into action; but it is not too late to equip them with a wound dressing far superior in results to any hitherto used, and one which is safe, easy to apply by semi-trained personnel, cheap, and ready to hand. There need be little or no suppuration of the grossly infected wounds we shall see; and débridement can be reduced to reasonable and practical limits. And once more: *No other hypertonic agent used approaches sodium sulphate in efficiency.*

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[3] —— (1940). *Lancet*, **1**, 216.

E. L. Kendig, jun., and T. W. Kirmsl (*Arch. Pediat.*, 1940, **57**, 1) state that though typhoid fever has declined both in morbidity and mortality among adults in the United States during the past few decades, the mortality among infants and children remains relatively high. Ninety-five cases of typhoid fever were treated in the wards of the Children's Medical Services of Bellevue Hospital, New York, from 1924 to 1938, during which time over 30,000 patients were admitted. Apart from an epidemic in Manhattan in 1924–5 only sporadic cases were admitted; forty-one were girls and fifty-four boys. The ages ranged from 14 months to 12 years. The sources of infection were as follows: contact with known cases 28; swimming in water probably polluted, 10; visits to resorts 5; raw milk and oysters 2 each; ice-cream sticks and water supply 1 case each; other foods 3; source undetermined 43. There were 7 deaths, which were due to gastro-intestinal haemorrhage in 4, and pneumonia, myocarditis, and meningitis 1 case each.

Reviews

BILIARY DISEASES

Diseases of the Gallbladder and Bile Ducts. By Waltman Walters, M.D., ScD., F.A.C.S., and Albert M. Snell, M.D., F.A.C.P. (Pp. 645; 342 illustrations on 195 figures. 50s. net.) Philadelphia and London: W. B. Saunders Company. 1940.

This book, with the weight of experience of the Mayo Clinic behind it, written by the heads of the surgical and medical divisions of the clinic, assisted by specialists, demands and will receive respect for the outstanding manner in which it deals with the problems of diseases of the gall-bladder and biliary ducts. Short chapters on the anatomy, physiology, and pathology of the biliary system—nearly thirty thousand gall-bladders removed surgically have been studied in laboratories of the Mayo Clinic—are followed by a discussion of the live topic of the relation of cholecystitis to gall-stones. In the view of the authors no form of cholecystic disease, gall-stones in particular, appears as a primary disorder; there must be an initial injury to the structure and function of the gall-bladder, which in turn may develop to the point of complete functional incapacity, formation of stone, or a state of chronic infection, and these may be combined. Initial injury may follow infection, disturbed cholesterol metabolism, or mechanical and toxic factors, and the typical stone-bearing, functionless, and infected gall-bladder may have arrived at its condition by one of several routes. The mechanism of formation probably varies with the type of stone, and no one hypothesis fits all the observed phenomena. Diseases of the gall-bladder should be studied in correlation with conditions in the stomach, duodenum, and remainder of the alimentary tract, and "in all probability are secondary organic manifestations of what might be called constitutional deficiencies." Diagnostic methods are described, and at the close of an instructive chapter on cholecystography Dr. Kirklin concludes that this is one of the most trustworthy tests at the service of the clinician.

In about 250 pages there is an admirable and well-illustrated account of the symptoms and clinical course of the diseases with which the book deals: cholecystitis, acute, chronic, and calculous; tumours of the gall-bladder and bile ducts; jaundice, cholangitis, and stone in the ducts. The authors are wrong, however, in saying that in pancreatitis the lipoid material in the stools is predominantly neutral fat rather than fatty acids (p. 332). Medical measures in treatment are not put forward with much enthusiasm. It may be that the experience of chronic and long-standing disease presenting itself at the Mayo Clinic after some amount of treatment leads to a surgical bias. Medical treatment has in view the overcoming of stasis in the gall-bladder and bile passages, the control of infection, and the relief of the reflex dyspeptic symptoms which so commonly are associated with stones. No one diet is likely to suit all patients, the caloric value must be adjusted to needs, but in general it should be non-irritating, with frequent small meals, of which the fat content is adjusted to the individual. Drugs and fatty foods may tend to cause relaxation of the sphincter of the common duct and favour evacuation of the gall-bladder, bile salts may promote choleresis, while alkalis and carminatives may relieve the associated reflex dyspepsia.

In regard to surgery the criteria for the diagnosis of cholecystic disease in general are essentially the same features which must be reviewed when the question of operation is to be decided. These are "a satisfactory account of biliary colic or of recurrent painful abdominal seizures resembling colic; residual tenderness in the region of the gall-bladder, or a palpable gall-bladder, following such attacks; persistent, intractable dyspepsia not relieved by ordinary measures; cholecystographic evidence of loss of function of the gall-bladder, or of the presence of stones, and exclusion of conditions which simulate cholecystitis." The surgical principles and details of operative procedure are described and illustrated elaborately, special emphasis being placed on pre- and post-operative methods and the symptoms which arise after cholecystectomy and in the presence of jaundice. No one available test of hepatic function is infallible, nor can the impression gained by careful clinical study be superseded, but the level of serum bilirubin does give information of value; a high value (20 mg. per 100 c.cm. or more) is a danger signal not to be disregarded. Long views may also be taken in advocating removal of the diseased gall-bladder when the favourable effect on associated vascular disease and the prevention of cancer arising in an organ subject to chronic irritation are kept in mind.

This is a stimulating and satisfactory book, broad in outlook and clear in statement. It is produced with all the sumptuousness of the well-known publishing house of W. B. Saunders.

SIR JAMES FRAZER, O.M., F.R.S.

James George Frazer. The Portrait of a Scholar. By R. Angus Downie. (Pp. 141. 5s. net.) London: Watts and Co.

Just half a century ago the literary world was startled by the publication of *The Golden Bough*; it was recognized as a portent of an era of thought as new as that provided by Darwin thirty years previously. The attraction of its matter was enhanced by the charm of its manner; new ideas were clothed in beautiful scholarly prose. The influence of those ideas has now spread so widely that it must be difficult for a later generation to realize that it aroused feelings akin to those excited in Keats by Chapman's *Homer*. What of its author—J. G. Frazer, that recluse Fellow of Trinity? Mr. Angus Downie, his sometime secretary and fervent admirer, is able to tell us. Frazer drew his inspiration from three sources—a Scottish home steeped in the literature of the Bible, a sound classical training at Glasgow, and at Cambridge the close friendship of the famous Robertson Smith, who had escaped from heresy-hunters into the haven of Christ's College. It was, however, Tylor's *Primitive Culture* which first turned his attention to anthropology. He found that the comparative method applied to religion soon enforced the conclusion that the course of its evolution has been, up to a certain point, very similar among all men. He did not deny the diffusion of culture, but attached more importance to psychological factors than did Elliot Smith; in effect his conception was not unlike that of Jung's collective unconscious. In *Psyche's Task* (1909) he demonstrated that among certain races and at certain times superstition had strengthened the respect for government, civil order, private property, and marriage—and lastly for human life, thereby contributing to the security of its enjoyment. But he had recognized also that at some stages of social evolution the supreme power tends to fall into the hands

of men of the keenest intelligence and the most unscrupulous character. Yet he has a good word to say for them, and thinks that more mischief has probably been wrought in the world by honest fools in high places than by intelligent rascals, for once the shrewd rogue has attained the height of his ambition he may, and often does, turn his talents to the service of the public. Written fifty years ago, these words have a new and painful interest to-day.

The legend of "The priest who slew the slayer" has captivated the imagination of almost every schoolboy, and is shown by Frazer to lie at the root of much unconscious imaginings. His researches provided a collection of facts and interpretations of great value to Freud, although his point of view was widely different. Indeed, as time goes on it becomes increasingly clear how much Freud owes to Frazer.

It is impossible even to allude to all his many other literary activities. In addition to stimulating thought he has enriched us with pen pictures of surpassing beauty, such as those of Lake Nemi and of Hymettus. His study of Ovid's *Fasti* is a serious contribution to classical learning, his imitations of eighteenth-century writers have deceived the very elect, while his poetry has the authentic ring. Loaded with honours, he remains at the ripe age of 86 the same modest, gentle, retiring spirit he has always been. As A. E. Housman, that severe critic, said in the course of an admirable appreciation, "The forgotten milestones of the road which man has travelled, the mazes and blind alleys of his appointed progress through time, are illuminated by your art and genius."

To those who would know more of the personality and work of this remarkable man we can cordially recommend the lucid and attractive account given in the pages of this book. But from the last clause of the author's statement that at Cambridge "his reputation is respected, his person revered, and his works ignored" we must register emphatic dissent from personal knowledge.

FRACTURES OF THE JAWS

Theory and Treatment of Fractures of the Jaws in Peace and War. By Horace Hayman Boyle, H.D.D. and L.D.S. (Pp. 288; 127 illustrations. 21s. net.) London: Henry Kimpton. 1940.

On opening this book one is confronted with what at first sight appears to be the design for a stained glass window of one of the saints. Closer examination, however, shows that this is merely a schematic drawing including a circle suggestive of a halo, but so placed that the biting surfaces of the teeth lie on its circumference. From a rather long preface, which may be of more interest to dentists than to surgeons, the fact emerges that the author holds that the jaw is a mill and not a lever. The importance of a mastery of the problems relating to jaw fractures on the part of those entrusted with the care of war wounds of the face and jaws is obvious, and this book is an attempt on the part of its author to enunciate and consider these problems in detail. Illustrations are plentiful and consist of photographs and line drawings well reproduced on highly glazed paper which, owing to the shine to which it gives rise, makes difficult reading, however, when it comes to following the text in artificial light. To the busy surgeon, concerned only with restoration of function with as nearly perfect an anatomical result as possible, much of this work will appear unnecessarily detailed and aiming at a mathematical precision so meticulous as to approach the absurd or the uneconomical. This is particularly the case when one considers the wonderfully compensating mechanism which Nature so often brings into operation, so that after division of the motor root of one trigeminal nerve the effect on jaw movements and bite is often only detectable with difficulty. To dentists there is no doubt much in this book which is controversial and worthy of study; but this aspect is beyond the scope of the reviewer, who, like many of his surgical colleagues, is only too glad of the collaboration of a dental surgeon in dealing with maxillary or mandibular fractures but to whom the details of dental prosthetics are of little concern. In any case these are beyond the ambit of most surgeons and practitioners of medicine.

TOMOGRAPHY

Tomography. By J. B. McDougall, M.D.Glasg., F.R.C.P.Ed., F.R.S.Ed. (Pp. 73; 110 illustrations. 21s. net.) London: H. K. Lewis and Co., Ltd. 1940.

In his monograph on tomography Dr. J. B. McDougall has had as his main object to present, to chest physicians in particular, a representative group of tomograms. In this he has succeeded very well. The book begins with a clear account of the principles and technique of tomography, and although the author's work has all been done with the elaborate and extremely efficient (and expensive!) apparatus made by the firm of "Sanitas," he points out how tomograms of a comparable quality may be produced by the inexpensive attachment to an ordinary Bucky couch devised by the late E. W. Twining.

The main part of the book is occupied by a beautiful series of radiographs and tomograms showing the value of tomography in the investigation of pulmonary tuberculosis. These have been well chosen, the legends are explicit, and the illustrations of a high quality. The author makes out a very good case for the use of tomography in the study of pulmonary tuberculosis in its various stages—and also when artificial pneumothorax or thoracoplasty has been performed. In the later pages he points out its use in carcinomatous bronchostenosis and lung abscess and in certain conditions in the skull.

This monograph, the work of one of the pioneers of tomography in this country, will well repay study by all interested in thoracic medicine.

INFECTIOUS DISEASES

Clinical Practice in Infectious Diseases. For Students, Practitioners and Medical Officers. By E. H. R. Harries, M.D., M.R.C.P., D.P.H., and M. Mitman, M.D., M.R.C.P., D.P.H., D.M.R.E. With a foreword by W. Allen Daley, M.D., F.R.C.P., D.P.H. (Pp. 468. 17s. 6d., plus 7d. postage.) Edinburgh: E. and S. Livingstone. 1940.

For the last five years or so it has been increasingly felt that the newer knowledge and practice of infectious diseases should be incorporated in a comprehensive textbook. This need has now been met by the production, within the modest dimensions of this new work, of an astonishingly complete conspectus of the subject. The common infectious diseases, together with the newer methods of control and treatment, are set out attractively in their new groupings—for example, the haemolytic streptococcal fevers. Concise accounts are also given of such allied conditions as gastro-enteritis of infants, glandular fever, undulant fever, psittacosis, epidemic louse-borne diseases, tetanus.

A preliminary section of ninety pages gives an account of principles of infection, resistance, allergy, general management, rashes, diet, and other general matters. This is a good arrangement in that it avoids repetition, but the inexperienced reader may well find this abstract treatment of the subject somewhat difficult to grasp, and should not follow too literally the authors' advice to

master this section fully before proceeding to the later chapters. The description of the individual diseases is admirably clear if somewhat uninspiring owing to the severely impersonal style of writing adopted. Throughout the book there is hardly a reference to a personal experience, or even to a lightly outlined case history which might adorn the tale. There are numerous excellent line drawings and tabular statements, the latter perhaps overdone. They form a good example of the almost mathematical approach to the subject which is characteristic of this book.

While the information is generally up to date, there are inevitably some lapses. The fatality of bronchopneumonia in children is estimated at 20 to 40 per cent. Surely the effect of chemotherapy in this disease has been forgotten. And that curious word "extravenous" on page 374! Is it a misprint for "extraneous"? And a bald statement that "for ventricular punctures in older patients a hole must be bored through the skull" is not very helpful when no details of technique are added. In place of the usual list of references a short summary is added at the end of each chapter. It is, however, little more than a list of disconnected words, and its value for the student, for whom it is obviously designed as an aid to cramming, is problematical. The more advanced reader would probably prefer the references, if only for the purpose of verifying the nationality of the author and the type of journal quoted. These are, however, but minor defects in what is a highly valuable book, and one much needed to-day alike for the under- and post-graduate student, and for the practitioner who desires to follow the newer trends of thought on this subject.

Notes on Books

Professor CARL WIGGERS, on finding a third edition of his book *Physiology in Health and Disease* called for within three years, has been confronted with a difficulty usual in such circumstances—how to introduce and blend new material with the old without inordinately increasing the bulk of the text. This he appears to have successfully accomplished by adopting a more concise style, by pruning less important material, and omitting things that have become obsolete. All teachers of physiology have to realize by experience that discussions designed to combat past errors interest students very little, since they start without preconceptions which are still apt to cling to their instructor. By omitting these space has been found for matters of more topical interest, such as chemo- and pressor receptors, electrographic chest leads, pre-natal respiration, new work on vitamins and retinal mechanisms, to mention only a few of the more important. The main plan of the book is, however, preserved—first, the application of the pure sciences to physiology, next the inculcation of general physiological principles, and finally a comparison between the results of physiological experiment and the clinical manifestations exhibited by patients. As we pointed out in a review of an earlier edition, this book is significant of a tendency which is making itself increasingly felt: the desire to break down the barrier between the two great stages in the student's career—the laboratory and the ward. This new and thoroughly revised edition should help to further that aim. It is published by Henry Kimpton at 42s.

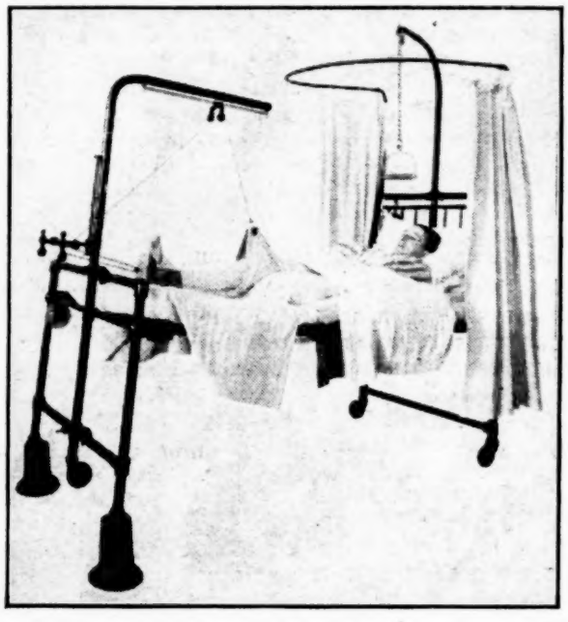
Profesor NOËL FIESSINGER offers his experience and sagacity to the medical student in *Les Premiers Pas en Médecine* (Paris, Masson et Cie, $0.70). This little book, introductory to a series on medical topics under the editorship of Dr. A. Sézary, is full of wisdom and charm. He divides his subject under three heads—the doctor, the disease, and the patient. Under the first head he discusses with wit and common sense the various reasons which induce the student to take up the vocation of medicine—for he clearly regards it as a vocation and its practice as an art. He considers the various attributes, mental, moral, and physical, that the profession of medicine demands, and no student could fail to gain much valuable help from the author's ripe judgment. Diseases are summarily discussed under two main types—exogenous and endogenous. The third section is a concise account of the methods of examination, which is illustrated by some simple and useful diagrams. Altogether a seductive introduction to the medical career, written with characteristic French lucidity.

Preparations and Appliances

THE B.R.I. BAR FOR FRACTURED FEMUR

Mr. KENNETH H. PRIDIE, M.B., F.R.C.S., assistant orthopaedic surgeon in charge of the Bristol Royal Infirmary Fracture Clinic, writes:

The "B.R.I. bar" has been designed by me for those who appreciate the advantages of Russell traction. It consists of an L-shaped bar which, with the aid of two clamps, will fix



to any hospital bed. It carries all the pulleys necessary for the correct position and treatment of fractures of the femur by the Russell method.

The accompanying photograph demonstrates the bar in use. The advantages are that it can be used for both legs at the same time and it is easy to dismantle and fix to any hospital bed.

To comply with those people who require the full Balkan beam, a telescopic end with a similar attachment has been designed to fix to the top half of a bed.

The apparatus has been made for me by Messrs. Masters and Co., Colston Street, Bristol.

AMINOPHYLLINE

"Aminophylline" (Burroughs Wellcome and Co.) is a combination of theophylline and ethylenediamine. This combination has been found to possess interesting therapeutic properties. It is an active diuretic and is believed to improve the circulation through the kidney and heart. In addition it acts as a stimulant to the medullary respiratory centres. It has been found of particular value in the treatment of cases showing Cheyne-Stokes respiration.

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THE MATERNITY HOSPITAL

The Canadian Medical Association through its Maternity Services Committee has rendered useful service in its *Report on Obstetrical Procedure and Practice in Hospitals*, a report which also carries the endorsement of the Canadian Hospital Council. The great thinly populated Provinces of Western Canada obviously offer exceptional difficulties in the formulation of a maternity hospital policy for the Dominion, and the fact that the chairman of the General Committee on Maternal Welfare, as well as all the members of the "nucleus," are representatives of Winnipeg may indicate that the main preoccupation of the report is with the wide areas rather than the great centres. In all countries the flow of maternity cases to hospital has risen rapidly in recent years, and this development has brought the maternity hospital and the many problems associated with it into a prominent place on the maternity front. The Canadian report points out that a not unimportant contribution to the lowering of the maternal mortality rate would be ensured if all hospitals accepting obstetric patients would set up and maintain the standard of organization and care which it recommends. Public opinion in this country also is deeply concerned with the question of maternal mortality, and it would certainly support measures designed to diminish the risks with which childbirth in hospital is still attended. An important and impressive consideration is the fact that failure to maintain adequate precautions against infection may involve the governing body and professional staff of a maternity hospital in legal proceedings. The action of the Canadian Medical Association in calling attention to the subject is both opportune and welcome.

Discussion of the "relative merits of hospital care as contrasted with home care" is excluded, as is also the question of the proportion that should be observed between beds reserved for difficult cases and those available for normal confinements. These matters are no doubt regarded as being ancillary to the main objective, which is the organization of the hospital rather than its function. The report recognizes two classes—namely, "large or well organized" and "small" maternity hospitals. A certain amount of overlapping is almost inevitable in this classification, but it is well to recognize that a large hospital is not in all cases well organized, and that not all requirements which can fairly be demanded of it will be strictly applicable to the small hospital, though there are certain criteria by which both must be judged. A clear statement of the conditions to which all obstetric hospitals, whether large or small, should conform would have added much to the helpfulness of the report. Again, the attitude of the report to the all-important subject of the segregation of suspect or frankly infected cases is somewhat disappointing. Adequate facilities for segregation constitute a basic requirement which should be imposed upon all hospitals, large or small. The great difficulty of completely eliminating risks of cross-infection in maternity units is generally recognized, but the transference of infection to a normal case delivered in hospital is both a tragedy and a reproach, and no essential precaution should therefore be omitted by any institution which accepts responsibility for obstetric cases. It would be well to regard the following as essential provisions: (1) the immediate removal of all frankly infected cases from the obstetric unit; (2) the segregation of all cases which come within the definition of "puerperal pyrexia" until diagnosis can be established; (3) there should be separate arrangements for the delivery of emergency cases which have developed fever, or in which previous attempts to terminate labour outside the hospital have been unsuccessful. The risks of cross-infection may be expected to fall to a minimum when these provisions have been made and when, in addition, the hospital can command a high degree of professional skill.

The somewhat thorny question of the medical personnel of a maternity hospital is dealt with frankly in the Canadian report. In the case of a large hospital staffed by specialists, or by men who have had special training in obstetrics, it is advised that the head of the unit should be invested with full authority and responsibility, should establish and maintain a standard technique, and should formulate programmes of education for interns and for students. If in addition the head of a unit were a whole-time officer residing in the hospital the position would be comparable to that of the Master of the Rotunda Hospital in Dublin. It appears, however, that this is not what is contemplated, for the maternity hospital is envisaged, generally speaking, as part of a general hospital, not as a special institution. The advantages of unified direction and control, from the point of view of both teaching and practice, have for long been recognized in other countries, though not in Great Britain. The practical difficulties of applying the principle are great, particularly in the case of old-established hospitals with a more or less numerous visiting staff, and so far as we are aware the attempt has not yet been made. Where new maternity hospitals are established the advisability of introducing the principle of unified control will no doubt be carefully considered.

Another important question is under what conditions medical practitioners who are not members of the hospital staff should be given facilities for the admission of patients under their own care either by courtesy of the visiting staff or by making the hospital "open" to all practitioners in the area it serves. For many reasons it is desirable that practitioners specially interested in midwifery should have the opportunity of working under the advantageous conditions offered by a well-organized institution. The serious difficulty

which awaits a hospital with an "open" staff is how to reconcile freedom of the individual with general supervision of the whole by the obstetric head, and the maintenance of a given standard of technique and practice. The Canadian report makes no attempt to evade this issue, but admits that it would be necessary to exert discipline in the case of practitioners who, for example, dealt in an unsatisfactory manner with conditions which might prove to be a source of danger to patients other than their own. Any further "repeated bad results" should call for intervention by the head of the unit, or even for refusal to allow the practitioner concerned to use the hospital. It must be recognized that up to the present the optimum balance between general supervision and individual freedom in maternity hospitals has not yet been worked out, and the experience of Canadian hospitals may prove to be a valuable aid to the solution of the problem.

A SYMPOSIUM ON THE BLOOD

In September, 1939, an Institute for the Consideration of the Blood and Blood-forming Organs was held at the University of Wisconsin on the beautiful shores of Lake Mendota. The word "institute" was used in the special sense of a temporary organization for the promotion of scientific knowledge, and a small group of English-speaking scientists was invited to read papers and to take part in round-table discussions. No arrangement could have been more laudable or delightful, for those invited were already known to each other by name and many had met in days past, so that the opportunity was provided to consolidate old scientific friendships and foster new ones. But more than one guest from Europe found himself unable to share these delights owing to the storm that broke out toward the end of August, 1939. For such as these the collected papers of the institute, which have now been published in one volume,[1] must be something more than a mere scientific publication, and it is impossible to review them without a wave of emotion. It can be said quite briefly, however, that the book is the most accurate and readable account available of the results and trends of recent haematological research.

In one of the most admirable papers in a very interesting series Meulengracht points out that to a great extent it is a common technique of examination which connects the so-called blood diseases, but when attention has been too much concentrated on the details of this examination haematologists have become preoccupied with morphological sophistries. The great events in haematology have been published not in the purely haematological journals but in those devoted to general medicine, and the pulse of life has beaten strongest when the gates to general medicine and pathology have been left wide open. It has never been possible to practise haematology as a specialty in the same sense as neurology or cardiology, and there is much to suggest that haematology has ceased to be a separate subdivision of science, like an insecure State which is dismembered and incorporated into its neighbours. Experimental leukaemia, of which Furth gives a stimulating review, has obviously become a branch of cancer research, and it is necessary for its students "to investigate fundamental problems other than those of leukaemia which arise in the course of their investigation." Pernicious anaemia and hypochromic anaemia just as obviously belong to the provinces of nutrition and digestion. Research on pernicious anaemia is still in the doldrums, and is likely to remain there until there is better centralization of clinical and post-mortem material and until clinical testing of effective substance can be replaced by a laboratory procedure. There are at present two baffling problems. The first is that, whereas the pyloric end of the stomach and the upper duodenum appear to be important sources of the substance effective in the cure of pernicious anaemia, there is no anatomical evidence that these areas are diseased in pernicious anaemia. The second is the discovery that the curative factor is found, in varying concentration, throughout the whole length of the intestine—it is not clear whether it is being secreted or absorbed there. A more active field at the moment is the study of the porphyrins, of which Watson gives what is perhaps the simplest and most lucid account that has yet appeared in print. It is hoped that the study of porphyrin metabolism will give us more insight into the mechanism and rate of haemoglobin synthesis, and there is at present great need for more data. The accumulation of such data demands a high degree of chemical skill, for the amounts of porphyrin excreted are fantastically small and their isolation and recognition are fraught with possibilities of error.

In clinical haematology the most obvious requirements at the moment are careful and prolonged studies of the natural history and possible aetiological factors of the aplastic (or refractory) anaemias and the obscure haemolytic anaemias. Rhoads, who has been able to collect a large series of refractory anaemias through the unique facilities of the Rockefeller Hospital, stresses the often prolonged and remittent character, the variations in haematological findings at different stages of the illness, and the difficulty of prognosis. A certain proportion of these anaemias, which had previously shown no immature cells in the circulation, no leukaemic infiltration of tissues, and no leukaemic tumours, eventually develop frank leukaemia, and there is clinical and experimental evidence to suggest that the same noxa may produce aplasia, sclerosis of the marrow, or leukaemia. Rhoads suggests that most of the refractory anaemias may be due to the toxic effects of cyclic chemical compounds of exogenous or endogenous origin. As regards the haemolytic anaemias, the last decade has seen the clear delineation of erythroblastosis foetalis, Mediterranean anaemia (Cooley), and paroxysmal haemoglobinuria with nocturnal haemoglobinaemia, but we still require more accurately documented information about the haematology, course, and after-history of the symptomatic and more acute haemolytic processes.

[1] *A Symposium on the Blood and Blood-forming Organs.* Madison: The University of Wisconsin Press. 1939. ($3.50.)

A NEW CONCEPTION OF PARATHYROID FUNCTION

In health the amount of calcium in the blood is kept closely within physiological limits. When the blood calcium is unduly high we suspect a parathyroid tumour, though somewhat similar changes can be produced by myelomatosis or carcinomatosis of the skeleton. When the blood calcium is low and there is no evidence of malnutrition we suspect parathyroid insufficiency. Thus we think of the parathyroid gland as being in control of calcium metabolism in the same way as the thyroid is in control of iodine and the adrenal of sodium chloride. Ever since the publication of Shelling's important book *The Parathyroids in Health and Disease*[1] workers in this field have realized that calcium is not the only ion affected and that phosphate is equally important. Not only do the parathyroid glands mobilize calcium ions from the storehouse in the bones; they also stimulate the excretion of phosphate by the kidney. Patients with parathyroid tetany are often resistant to treatment in spite of a high calcium diet and injections of parathormone, and it is necessary to decrease the intake of phosphate as well as to increase the calcium. These ideas are now generally accepted, but they have been developed in a more speculative way by Helfet.[2] In hyperparathyroidism there are three main groups of symptoms—the hypercalcaemia with its depressing general effects, the increased excretion of calcium in the urine with the tendency to nephrolithiasis and renal failure, and the abstraction of calcium from the skeleton. The bony changes are highly characteristic on *x*-ray examination or biopsy, and are known as fibrocystic disease. However, fibrocystic disease of bone can occur without changes in the blood chemistry or the parathyroid glands. These cases are therefore known as "generalized osteitis fibrosa cystica not due to hyperparathyroidism." Helfet suggests that in such patients there is a relative or physiological hyperparathyroidism, and that the body is unable to deal with the phosphates without soliciting the aid of the parathyroids. The same pathogenesis is assumed for rheumatoid arthritis and Paget's disease. Helfet therefore recommends treatment by diminution of the phosphate absorption, and for this purpose prescribes aluminium acetate; this combines with phosphate in the intestine, precipitating aluminium phosphate, which is excreted unchanged. He also gives a pint of milk a day. Some fourteen cases are reported with accounts of clinical improvement. We may be forgiven, in the present stage of development of clinical science, for making some criticisms of the mode of approach to the problem. Preliminary reports are rarely justifiable, especially when they deal with a treatment which is based on speculation and not without danger. Long-continued dosage with aluminium salts is known to produce rickets in animals, and little is known of its action in man. Helfet refers to an American study, but this appeared in a journal which will be available to few readers of his article. It would have been wiser to have published independent observations on the effect of varying dosage of aluminium on the calcium and phosphorus balance in normal men and animals. Moreover, if the treatment is of value in relieving the demands on the parathyroid it should be possible to demonstrate its effects in patients with parathyroid insufficiency. The condition is not common, but with modern methods of management patients can be so accurately standardized as to provide ideal test subjects. In rheumatoid arthritis many data can be recorded exactly and serially, such as the weight, pulse rate, erythrocyte sedimentation rate, number of joints involved, diameter of swollen joints, glucose tolerance test, etc. No report which does not conform to standards such as these can expect credence to-day, and until these data are available our readers will be ill advised to treat sufferers from rheumatoid arthritis with aluminium salts. Their patients will probably do much better with the pint of milk alone.

[1] Shelling, D. H., London, 1935.
[2] *Brit. J. Surg.*, 1940, **27**, 651.

AMERICAN HOSPITAL IN ENGLAND

At the very outset of the war our professional colleagues in the U.S.A., in letters to friends in this country, were expressing the hope that they could come over to help us in the task of treating the wounded and disabled. Nor did they rest content with expressing hopes. In September of last year Prof. Robert Osgood, of Boston, was making plans for a contingent of American orthopaedic surgeons to come to Great Britain. It seems but natural and right that the move should have begun with such a distinguished representative of orthopaedic surgery, for Prof. Osgood was on Sir Robert Jones's staff in the last war, when American orthopaedic surgeons rendered such great service to our wounded. Prof. Osgood's efforts have been energetically seconded by Dr. Philip Wilson, who is professor of orthopaedic surgery at Columbia Medical School. A medical board has been formed of prominent medical men in American universities—Columbia, Cornell, Harvard, Johns Hopkins, Michigan, Chicago—and of other physicians and surgeons. The scheme, still predominantly orthopaedic in aim, grew into one that envisaged the establishment in this country of an American Hospital of a thousand beds, staffed by American surgeons, physicians, radiologist, pathologist, and some American nurses. With an open-handed generosity that is characteristic those responsible for this scheme have already promised a contribution of at least $100,000 a year towards the cost of maintaining the hospital. It is hardly necessary to point out that the promised services of the American medical contingent will be entirely civil in character and might well operate under the wing of such an organization as the Red Cross. Such a scheme has the sympathetic support of high authorities on both sides of the Atlantic. The vagaries of war may postpone the formation of an American Hospital in England indefinitely. In the meantime we can but say "Thank you" to those whose friendship for this country and sense of professional unity make them ready to leave their more tranquil shores and to share with us the task of repairing the effects of bullet, shell, and bomb.

HORMONE CONTROL OF LACTATION

Prolactin only causes lactation in the developed mammary gland. This is true whether the development of the breasts has occurred naturally or after suitable hormone treatment. It is therefore difficult to understand why lactation should only begin after parturition, as the glands are developed during pregnancy presumably by the large amounts of oestrogen then present in the body. In explanation, it has been postulated that the placenta may inhibit lactation or the secretion of prolactin, for it is known that lactation does not occur in cases of retained placenta. It has further been suggested that oestrogen is the inhibitory factor. This is not altogether borne out by the fact that stilboestrol inuncted on the udders of virgin goats will start a copious milk secretion, as recently demonstrated by Folley, Watson, and

Bottomley.[1] Their preliminary note does, however, suggest that larger doses may not have this action. It may be that small doses of oestrogen stimulate and large doses inhibit secretion of prolactin. This would be strictly analogous to the effects of oestrogen on the secretion of gonadotrophic hormone from the pituitary. But again there is evidence that this is not so, as Lessmann[2] has found greater amounts of prolactin in the pituitary gland of a pregnant woman than in normal pituitaries. This is strong evidence that secretion of prolactin is not inhibited, particularly as the gonadotrophin content of the oestrogen-depressed hypophysis is reduced. Lessmann's experiments also cast much doubt on the whole question of the inhibitory role of the placenta, because he actually finds prolactin activity to be present in the placenta itself and also in the urine of patients with chorion epithelioma or hydatidiform mole. This suggests that the placenta takes over the production of prolactin as well as of luteinizing hormone and oestrogen. It would also serve as an explanation of the finding by Newton and Beck[3] that secretion of milk may be present in hypophysectomized mice if the foetuses are destroyed but the placentae left intact. These mice were, however, killed at about the time of parturition, and it is not clear whether secretion was definitely initiated before parturition. If secretion can occur under these conditions it would suggest that the pituitary gland is responsible for the absence of lactation during pregnancy. The quantitative data on the presence of prolactin in the placenta are, however, not yet available, and as Lessmann also finds lactogenic activity in human and animal liver extracts (prepared according to Riddle and Bates's method for extraction from pituitary gland) it is possible that the activity is widespread throughout the body. Confirmation of and more detailed information on these points will be awaited with interest.

JUVENILE RHEUMATISM IN DUBLIN

The importance of the problem of rheumatic infection in children in Eire was brought to the fore in 1935 when the National Committee against Rheumatism in Ireland was formed—largely through the energy of the late Marchioness of Aberdeen and Temair. Later this committee started a scheme of supervisory rheumatism clinics in conjunction with certain hospital and public health authorities, and it is from the records of these clinics since May, 1936, that Dr. P. J. Holland Clarke obtains figures on the incidence of rheumatism in Dublin's school population.[4] Over a period of three years 1,228 children from the city areas attended the clinics and, according to school medical service records, a further 570 should have attended. Some 44 per cent. of these children were thought to be rheumatic, giving a round figure of 800 rheumatic children in three years, corresponding to an incidence of about 12 per 1,000 school children. Cardiac lesions were found in about 20 per cent. of children examined, and it was estimated that heart disease occurred in five out of every 1,000 in the school population. The most recent figures for London and for Cardiff agree very closely with those for Dublin, and Dr. Clarke, in a detailed analysis of his figures, confirms most of the observations of other workers in this country. He finds, for example, that there are similar seasonal variations and that no particular type of child—that is, fair- or dark-haired, etc.—is affected. He also finds a history of infection of the upper respiratory tract in 86 per cent. of cases of juvenile rheumatism occurring in areas where there is "density of population, overcrowding of living (and particularly of sleeping) accommodation, and proximity to low-lying areas close to river and waterways." The problem of juvenile rheumatism in Dublin is being dealt with by these supervisory clinics. Acute cases are admitted to the hospital which houses the clinic, advice is given to parents, and efforts are made to improve faulty housing conditions. In 1937 a special convalescent unit was set up at Blackrock, where twenty beds are available and fully occupied for an average stay of thirteen weeks. Dr. Clarke estimates, however, that thirty more beds are necessary in the convalescent unit, and also at least one special school for physically defective children.

[1] *J. Physiol.*, 1940, **98**, 15P.
[2] *Z. Geburtsh. Gynäk.*, 1939, **119**, 271.
[3] *J. Endocrinol.*, 1939, **1**, 65.
[4] *Irish J. med. Sci.*, 1940, **171**, 97.

AN EXPERIMENT STANDS OVER

One useful piece of social experiment which the war has brought to a close for the time being is the Pioneer Health Centre at Peckham. The building, which was used by a thousand or more people every day, is empty, but the work in some of its aspects goes on, and the ideas which started it are still very much in currency. Some of them gained a new enforcement from the war itself, for the war has illuminated one of the primary teachings of the Centre, that the very smallest unit on which any item of social construction can be based is the family—a thing which the official mind has been prone to overlook. Had the Centre been able to continue in full operation a good deal of lively and interesting work would have been done. It was intended to incorporate a training school for health, with fellowships for students in the technique of periodic health overhaul and other aspects of family education. The Centre has also been able to afford on a small scale a demonstration of communal evacuation. It had an adjunct to its work in the shape of a farm at Bromley Common, consisting of a large house and thirty-nine acres of land, only seven miles from Peckham itself. When war came twenty-nine young families, with fifty children under 5 years of age, elected to go to the farm with a view to living communally and carrying on food production. Some of the families have returned, but the mothers remaining have run the homestead under the direction of two supervisors, and those who have braved the winter at the farm have shown an increase of health and vitality said to be astonishing. During the whole time the overhauls of all the children have been continued, including haemoglobin estimations, preventive inoculation, and so on, the ante-natal and post-natal care of the three pregnant women has been carried out, and the infant consultations have gone on without a break. The fathers are at their jobs in London, but married quarters are provided for them when on leave. Another aspect of the work of the Centre which is not being lost is the analysis of the records of the periodic overhauls of 1,200 families, and a full report of the Centre's four years' work in this respect is being prepared for publication. The analysis has shown that in the sample of the populace examined—a representative South London population—although 20% of the individuals concerned knew that they were sick, only 7% were receiving treatment. This means that the provided medical services, however elaborate, are touching little more than one-third of the people who know that something is wrong with them. Again, in 86% of the

people examined some disorder was found, but only 20% were aware of it. The vast majority of the people did not know that there was any specific trouble, and only a diagnostician could have known. It is concluded that the skill of the medical profession is not being exerted on a very large number of people who could presumably benefit from that skill, and that disorder does not in the majority of cases reach the medical profession until it has become chronic. We look forward to the biologists not only resuming their search for material but finding their reward in a saner future.

SCLERAL ABSCESSES IN RHEUMATOID ARTHRITIS

Since Van der Hoeve in 1934 reported four cases of hole formation in the sclera under the name of scleromalacia perforans other observers have emphasized that polyarthritis is almost always present in this condition, and that inflammatory reactions are to be found in the sclera before the uvea is exposed and there is any secondary infection in the eye. Van der Hoeve's conception of the disease as a degenerative lesion does not appear to be substantiated by these observations. That the condition is a genuine inflammatory reaction and part of a general infection of which rheumatoid arthritis is the most prominent feature is supported by a case described by Eggers,[1] in which the patient, a woman aged 37 years, died in hospital after 166 days of unavailing treatment for subacute rheumatic polyarthritis. All laboratory tests had been negative except that the sedimentation rate was between 100 and 130 mm. per hour. Towards the end of the patient's life three comparatively large swellings, two in the right eye and one in the left, appeared in the sclera. Excision and biopsy told nothing except that the condition was inflammatory; actually the swellings were abscesses which re-formed. Before she died bilateral uveitis and massive bilateral vitreous haemorrhage destroyed all sight, sclerosing keratitis of one cornea being a terminal complication. No causative organism could be established, and the problem of necroscleritis nodosa (as the condition has been named by Verhoeff and King) remains part of the problem of rheumatoid polyarthritis.

REGIONALIZATION OF PROVINCIAL HOSPITALS

The Medical Advisory Committee constituted by the Nuffield Trustees to advise them and the Provincial Hospitals Regionalization Committee of the Trust on the medical policy and problems of their work has been composed as follows:

Sir Farquhar Buzzard (Chairman), Dr. J. A. Brown, Dr. S. C. Dyke, Sir John Fraser, Sir Wilson Jameson, Dr. W. S. Macdonald, Dr. J. M. Mackintosh, Sir Edward Mellanby, Sir Frederick Menzies, Mr. R. L. Newell, Dr. R. H. Parry, Prof. R. M. F. Picken (representing Society of Medical Officers of Health), Dr. W. N. Pickles, Prof. H. Platt, Prof. J. A. Ryle, Mr. H. S. Souttar (Chairman of Council, British Medical Association), Dr. J. Spence, and Prof. W. W. C. Topley.

The functions of the Committee will be to receive and report on questions referred to it by the Trustees or by the Regionalization Committee, to arrange for its members to inspect personally the conditions obtaining in a region or division and to report thereon, and to communicate directly to the Trustees any expression of opinion formed by the Committee on matters of medical policy and interest in so far as they concern the actions and purpose of the Trust.

[1] *Arch. Ophthal.*, Chicago, 1940, **23**, 501.

DOMINION HOSPITALITY FOR DOCTORS' CHILDREN

Further details are now available of the offer of doctors in Australia to take into their homes the children of British doctors. Australian doctors have offered to take into their homes children under 16, either unaccompanied or accompanied by their mothers, to a total of 500. The arrangements will be made between the Secretary of the British Medical Association and the Secretary of the Federal Council of the British Medical Association in Australia. Parents will be responsible for paying the passage money, while education and maintenance will be the subject of individual arrangements made subsequently between the parties brought into contact through this scheme. This is essentially a private scheme to place doctors' children in doctors' homes, augmenting but quite separate from the official scheme. The British Medical Association in this country will select the family units or children to go under this offer. It will endeavour to make the shipping arrangements for those covered by the scheme, although it cannot guarantee to do so. It will endeavour also to act as a medium for obtaining the necessary passports and exit permits. Any doctor who desires to send his child or children under 16 years of age, with or without the mother, is asked to send a postcard to this effect to the Secretary of the British Medical Association, B.M.A. House, Tavistock Square, W.C.1. In reply he will receive a form of application, together with a form of application for a passport and a form of application for an exit permit. These forms should be filled up and returned immediately *in all cases in which it has been decided to seek to take advantage of this offer.* All the information at present available is contained in this statement, and the Secretary of the Association appeals to doctors to spare him unnecessary correspondence. The nature of Canada's offer is not yet known in detail, and a further announcement will be made at the earliest opportunity.

THE PAPER SHORTAGE

From messages reaching this office it is plain that many readers appreciate the difficulties under which medical periodicals are now being carried on, and that they are well aware of the restrictions upon space imposed by the paper shortage. Supplies of paper have been rationed with progressive rigour by the Paper Control, the price of paper has mounted steeply, and all newspapers and journals in this country are now printing far fewer pages. Under such conditions a due balance between the different parts of the *British Medical Journal* can only be preserved by strict selection and compression of all material published. We appeal to everyone preparing any communication intended for publication to apply his critical faculty to his own writing to attain the utmost conciseness. As it is no longer possible to acknowledge the receipt of all letters and memoranda, etc., or to continue the practice of sending out proofs of them to authors, the Editor must reserve the right to shorten current communications which, though they cannot be printed in full, contain matter the publication of which would be of advantage to the profession. Correspondents will help much by cultivating brevity and forbearance.

We much regret to announce the death of Dr. D. Elliot Dickson of Lochgelly, Fife, for many years a leading member of the Scottish Committee of the British Medical Association.

THE NATION'S LARDER IN WARTIME

This is an abridged version of one of a series of lectures recently delivered before the Royal Institution [1]

FOOD AND THE HOUSEWIFE

BY

V. H. MOTTRAM, M.A.

Even if the scientists knew the whole truth about the work that foods do in the body and the way in which they do it, it would be almost impossible for the housewife to cater scientifically. She would have to cater for many different daily needs of calories, of two types of proteins, of at least four inorganic substances—two metals and two non-metals—and of seven different vitamins. It is probable that no person could carry in his head the calorie values of the fifty or sixty different foods which we eat, their percentage compositions as regards first- and second-class proteins, the amounts of calcium, iron, iodine, and phosphorus in those foods, and the distribution of the various vitamins among them. It is therefore unwise for the housewife to attempt to do so and, indeed, unwise for her to trouble herself much, if at all, about calories, proteins, inorganic elements, and vitamins. For were she to try to memorize such data it is likely that one or another of the necessary food elements would absorb her attention to the exclusion of all others.

Nor is the study of dietetics anywhere near finality. The last word has not been said about the vitamins, and it may be that there are more to be discovered. Nor can we yet tell how many calories a child or adult needs simply by measuring his height and weight and taking his age. There is still a large measure of incalculability about the food needs of a person, and so instead of counting on a certainty it is necessary to make shift with probability. But the probability of our makeshift is high. We can be almost certain that if we took an East-End child and put him on a midday meal of cheese, vitaminized margarine, wholemeal bread, milk, a raw carrot or so, and an orange he would, at the end of three months, look fitter and be clearer skinned—and possibly more vivacious and naughty—than one who had regularly his cut from the joint and two vegetables followed by a pudding.

The Three Classes of Foods

The housewife buys her food at six different shops or, possibly, departments in the departmental stores—the baker and confectioner, the butcher, the dairyman, the fishmonger, the greengrocer, and the grocer. A modern tendency is to group together all the things which keep easily under grocery, and so we buy nowadays condensed milk, bacon, and cheese, and even pasteurized milk in cartons from the grocer, leaving the perishable foods, which need a different treatment, each to be attended by its own specialist. These easily kept foods belong almost entirely to the class of foods from which we derive energy and warmth in large amounts and but little else. As these foods keep well and are on the whole inexpensive for what they give, wartime tends to make us consume more of these energy- and warmth-producing foods than of the other quite as essential foods. One effect of war and emergency is to unbalance our diet. We eat too much of the energy- and warmth-producing foods and too little of those which build up the body and of those which protect it.

The body-building foods—namely, milk, cheese, fish, meat, and eggs—are those which consist of much the same fundamental stuff as the body. It is true that some other foods, such as bread and pulses, contain body-building material, but there are practically no physiologists or dietitians who consider those two foods as good as the first named. The term "body-building" is simple and understandable. It has an obvious meaning as regards the child; and even in the adult, parts of the body are seen continually to grow, parts wear out or get damaged and must be replaced and made good.

The body-protecting foods are those which contain the vitamins and the essential inorganic elements. They obtained this name because they protect the body against sickness in a very special way.

The foods which the housewife buys according to what they do in the body may be grouped in the following way:

Group I.—The warmth- and energy-producing foods:
Bread, cake, pastry, scones, etc.
Sugar, jam, syrup, treacle, flour, biscuits, dried fruit, pulses, lard, margarine, and bacon.

Group II.—The body-building foods:
Milk, cheese, eggs.
Meat, offal, sausages, poultry, and game.
Fish.

Group III.—The protective foods:
Class I: The dairy foods: milk, cheese, eggs, butter, cream, vitaminized margarine.
Class II: Greengroceries.
Class III: The fat fish.

The warmth- and energy-producing foods are good for little besides warmth and energy, and they should not, and cannot, replace the body-building foods or the protective foods. On the other hand, it is extravagant to use the body-building foods as energy foods, and it is impossible to use all the body-building foods as protective foods. Similarly the protective foods often cannot be used to produce energy, and many are almost devoid of body-building power. The three groups therefore cannot replace each other in the diet.

In the above classification Group III has been divided into three classes, whereas Group II has not. This is because each food mentioned in Group II can replace any of the others. Thus milk may replace meat or fish and cheese may replace the same foods. But in Group III the dairy foods cannot take the place of the greengroceries or of the fat fish. All three classes of the protective foods must be represented in the diet. This is practically the only feat of memory which is asked of the housewife who wishes to cater according to dietetic principles.

A Word of Caution about Fruits and Vegetables

It is usual to say "fruits and vegetables," and indeed that is a fairly satisfactory statement in the ordinary middle-class home where the vegetables are not overlooked and are eaten as soon as they are cooked and where the fruit will include oranges, grapefruit, and bananas in winter and plenty of summer fruits in summer. But we have to admit that it is possible to choose fruits and vegetables which possess next to nothing of the materials for which we are bidden to eat those foods. A man could by choosing grapes, cherries, plums, pears, and apples among the fruits, and lettuce, celery, onions, and carrots among the salads and vegetables, steer himself almost clear of calcium, iron, and vitamin C. So we must be a little more specific concerning which fruits and vegetables contain that vitamin and how to obviate the fact that we lose some of it in the process of cooking.

[1] The lectures will be published *in extenso* by Messrs. G. Bell and Sons, Ltd., of York House, Portugal Street, W.C.2.

The very prevalent idea that cooking destroys the vitamins is false. But two of the vitamins are somewhat susceptible to heat and oxidation, particularly the latter, so that there is a question whether cooking may not destroy those two. It is only vitamin C about which we need to be at all careful. When greens or potatoes or black currants are boiled some of the vitamin C passes out into the water and some is also destroyed. When therefore we throw away the water from the greens we throw away about half the vitamin C content. With black currants and fruit compotes stewing does not matter, because we eat the juice with the fruit. There is further destruction of vitamin C, however, if the cooked fruits and vegetables are kept for a long time or are re-heated. So-called hay-box cookery is a suspect process so far as vitamin C is concerned, but it is a perfectly satisfactory method so long as one is aware of that fact. Vegetables served in restaurants or institutions or Army canteens or camps are almost certain to have lost much of their vitamin C.

Foods containing Vitamin C

As there is this uncertainty about vitamin C, and greengroceries are placed among the protective foods mainly, though not entirely, because of their possession of large amounts of this vitamin, the following table is given of those fruits and vegetables which are best in this respect. Each row is approximately in order of value in supplying vitamin C.

FRUITS AND VEGETABLES WITH LARGE AMOUNTS OF VITAMIN C

Home-grown fruits:
Black currants, strawberries, red and white currants, raspberries, loganberries, and gooseberries.

Foreign fruits:
Oranges, lemons, grapefruits, and bananas.

Home-grown salads:
Watercress, tomatoes, radishes, mustard and cress.

Home-grown vegetables:
Sprouts, cabbage, swede turnip, spinach, white turnip, and potatoes.

FRUIT AND VEGETABLES WITH LITTLE OR NO VITAMIN C

Apples (with the exception of the Bramley seedling)	Bean (runner)
Cherries	Carrots
Grapes	Lettuce
Pears	Onions (with the exception of the leek)
Plums	Parsnips

It is evident that the housewife has to be a little careful in choosing her fruits and vegetables among protective foods. But the difficulty is not so great as it appears at first sight. It can easily be solved in one or other quite simple ways. One is the routine service of half a grapefruit or an orange, or the juice of these, every day. The tomato cocktail, even if it comes from a can or a bottle, may help in this direction, though complete reliance should not be placed upon it. Another method is to serve a raw salad every day, chosen from the salads and vegetables mentioned above; or in summer-time a compote of raw or stewed fruits. When extreme economy has to be practised raw salads of sprouts, cabbage, or swede turnip may be taken.

The Average Diet

Probably the best way to make one's diet sound from the point of view of modern dietetics is to take one's own diet, examine it in the light of the above statements, and then to replace if necessary some foods by others known to be more advantageous.

[Professor Mottram here gave a sample of the normal business man's menus for the day, putting beside the items E for energy foods, B for body-building foods, and PI, PII, and PIII for the three classes of protective foods. He then suggested how such a diet might be slightly modified so as to make certain of the class PII, which was deficient in the diet he had just given. The result was the following daily menu.]

Breakfast:	
Grapefruit	PII
Grilled herring	B and PIII
Toast	E
Marmalade	E
Butter	E and PI
Coffee	*nil*
Milk	B and PI
Mid-morning:	
Milk	B and PI
Banana	E and PII
Lunch:	
Meat	B
Potatoes	E
Greens	? PII
Steamed pudding	E
Tea:	
Cup of tea	*nil*
Cress sandwich	E and PII
Dinner:	
Orange or tomato cocktail	PII
Joint	B
Potatoes	E and possibly PII
Peas	possibly PII
Apple pie	E and possibly PII
Cheese	B and PI
Biscuits	E
Butter	E and PI

In such menus there is no doubt of the addition of PII and PIII, and there is nothing in this diet that the average person would object to unless it be the herring. It is not necessary that the fat fish should form part of everyday menus. There is no need for it to appear more than once or twice a week, though there is evidence that people living on a fish diet and treating the fish liver as a highly prized luxury have finer teeth than the majority of us.

Food in Wartime

So far we have been writing as if there were no restriction in our foods, either by rationing or by the rise of price. It would be well now to consider a sane plan of drawing up a diet from first principles, and it is as follows:

1. As every survey of British diets shows, it is the protective foods which are lacking, therefore it is well to begin with them and include a sufficiency. Such a sufficiency is obtained if we have:

   Class i:
   - 1 pint of milk per day.
   - 1–2 oz. of cheese.
   - 1–2 oz. of vitaminized margarine or butter.
   - 1 egg (though this is not essential).

   Class ii:
   - One helping per day of the special fruits and salads of Table I.

   Class iii:
   - One helping of fat fish once (or, better, twice) a week.

2. On fish days practically enough body-building material has been obtained, but most people would like to add, say, 2 oz. meat, and with this would be served two vegetables. The best would be potatoes with either green vegetables or carrots. Such procedure would make sure of the right amount of body-building material and also add vitamin A and some iron.
3. For the rest, appetite and one's purse can be consulted: appetite will determine how much, and one's purse determine what, shall be eaten.

As the energy foods form by far the largest bulk of what we eat it is upon these that money can best and most easily be saved. The cheap foods for energy are bread, most cereals (when not put up in fancy packets), dried peas and beans, sugar, flour, treacle, syrup, margarine,

suet, and potatoes. Dried fruits and jams are not expensive. To use fish and meat for energy foods, as was the rule in schools and institutions, is extravagant, but if body-building foods are so used it is found that cheese and herrings are among the cheapest and that milk is cheaper than meat. Economy in diet includes substituting milk, herrings, and cheese for meat, because not only are they cheaper for body-building and for energy purposes, but they have body-protecting power as well, of which meat has little.

If we range foods purely by their energy value, which indeed is a reasonable starting-point, though a logical extreme is to be avoided, we find that next to the foods we have enumerated above come the fat fish, cheese, and bacon; then imported meats begin to appear (led by "scrag end" of Canterbury mutton); later appear the cheap joints of imported beef, and mingled with them the cheaper cuts of home-produced mutton. Expensive from the energy view are nearly all fresh fruits, most vegetables, and the white fish, though, of course, some are dearer than others.

Putting this in a less long-winded way may we suggest to the housewife troubled by rationing that she should:

1. Never on any account decrease the supply of milk to her family but actually increase it.
2. Replace any meat lost owing to rationing by milk, cheese, and fish (fat fish is best).
3. Use vitaminized margarine to replace any butter lost due to rationing.
4. Never omit one helping per day of one of the raw fruits and vegetables enumerated above.
5. Replace some of the white bread of the diet by wholemeal bread because of the loss from the diet of bacon and ham, due to rationing.
6. Use canned goods—fruit, vegetables, and fish—if they can be afforded and fresh supplies are short.

In this way she will certainly avoid any danger due to restriction of food through rationing.

FRACTURE CLINICS: PROPOSED NATIONAL SCHEME

The British Hospitals Association proposes, in a memorandum which has been submitted to the Ministry of Health, that the State should set up a special committee to promote a fracture scheme in conjunction with the existing hospitals. The State would be asked to make an initial grant of £250,000 towards the cost of the scheme, and the Association would draw up a plan to provide the nucleus of an organization and suggest the necessary personnel.

The Pre-war Plan

In 1936 the Home Office set up a Rehabilitation Committee to consider the facilities available for providing in peacetime the special treatment which fracture cases require. This body recommended in August, 1939, a scheme for setting up fracture services throughout the country, and made certain proposals which they hoped would enable the voluntary hospitals to finance them. The outbreak of war made this impossible so far as the hospitals were concerned, and the local authorities, to which it was suggested the hospitals should look for financial assistance, were fully occupied with other pressing problems. The likelihood of heavy casualties, both military and civil, is now considered to call for the direct intervention of the State in the setting up of such clinics.

It is pointed out, however, that it would be a mistake for the State to set up its own fracture clinics otherwise than in full co-operation with the voluntary hospitals. The voluntary hospitals treat nearly 90% of the fractures sustained in peacetime, and all that would now be required of them would be a measure of reorganization and extension of existing services. Their fracture departments, covering surgical treatment, physiotherapy, and remedial exercises, would have to be placed under the control of a surgeon, preferably a specialist, with a team of assistants, radiographers, and nurses on full-time service. Special equipment would have to be provided, including mobile *x*-ray units. The only problem which the hospitals themselves could not solve would be that of finance.

Fracture Services at Key Hospitals

Assuming that suitable accommodation is available or could be requisitioned, it is considered that the cost of setting up the additional fracture services attached to existing hospitals would work out roughly at about £2 per case. This would not be the total cost of treating a fracture, but the cost of the improvement on present services which is so urgently required. The total number of fracture cases treated in peacetime in all hospitals, voluntary or municipal, was about 200,000. Allowing for the expected increase in industrial accidents under wartime conditions as well as for war casualties, it is considered necessary to calculate on a figure of not fewer than 500,000 fractures a year. Only eighty-six hospitals in Great Britain, apart from twenty-four orthopaedic hospitals, have fully organized fracture services. In seventy others the service is only partially organized. Probably only 100,000 cases a year could obtain treatment adequately in the fracture services as they function at present. The complete fracture scheme would therefore require the provision of clinics for the treatment of 400,000, the cost of which would be, inclusive of capital expenditure, nearly £1,000,000 for the first year and £600,000 for the second and subsequent years. The immediate aim should be to ensure that a fracture service is established at a key hospital in each area at once, and for this it is suggested that the State should make an initial grant of £250,000 to cover the first year's cost of providing fracture clinics at thirty of the larger and forty of the smaller hospitals. Two other needs are the provision of rehabilitation or vocational training centres and also of settlements where those who have been too seriously incapacitated to be able to resume their ordinary work can be housed and taught crafts. It is pointed out how largely industry would benefit from such a scheme, probably to the extent of £1,000,000 a year. Industry, therefore, might be asked to contribute a part of the fund. Other points made are the likely saving in State pensions by averting permanent disability and also the fact that by attaching the factory clinics to existing hospitals it would be possible to make a war emergency measure part of a long-range peacetime policy.

In 1933 the Council of the British Medical Association appointed a committee, which reported in 1935,[1] to consider the existing arrangements for the treatment of fractures. Among the recommendations which it laid down as essential conditions of a fracture service were the segregation of cases, continuity of treatment, after-care, and unity of control. It also made some practical suggestions for a model fracture unit, which included rehabilitation centres for the provision of graduated work. The B.M.A. committee did not enter into financial considerations.

[1] *British Medical Journal Supplement*, February 16, 1935.

As announced in the *Journal* of June 15 (p. 1001) the decision of the University of Cambridge to cease to grant the Diploma in Medical Radiology and Electrology after October, 1941, has been rescinded. Courses and examinations for the diploma will be continued during the period of national emergency and at least a year's notice of its discontinuance will be given. The next course of study will begin about October 3, and is open to registered medical men and women who satisfy the committee that they have had sufficient post-graduate clinical experience. Information may be had from Mr. G. Stead, M.A., secretary for the diploma, Cavendish Laboratory, Cambridge; or from the general secretary, British Institute of Radiology, 32, Welbeck Street, London, W.1.

Correspondence

Elevation in the Immediate Treatment of Severe Haemorrhage and Shock

SIR,—Elevation as a first-aid measure in the treatment of bleeding is often given but a passing mention in first-aid teaching. I wish to emphasize its importance and high value in the immediate treatment of severe haemorrhage and shock, especially under existing conditions.

For practical purposes in first-aid treatment the effects of severe haemorrhage and primary shock may be regarded as the same. Primary, as distinct from secondary, shock occurs immediately after injury and is independent of septic absorption. It may occur as "pure" shock, the result of the effect on the central nervous system, more especially the medulla oblongata, of excessive peripheral stimuli as in a blow over the solar plexus, or from extensive burns or scalds. It may occur as an effect of severe haemorrhage upon the medulla and the heart. Here the amount of circulating blood is small owing to the external loss, the blood pressure is low, the metabolism of the medulla and the heart is immediately lowered, and their functional activity correspondingly depressed. In "pure" shock the immediate effect of injury is an intense depression of the medulla and its vital centres, with consequent feeble heart's action and low blood pressure. Much of the blood is functionally lost from the circulation owing to its stagnating in dilated capillaries—the capillary "trap." (This stagnation used to be said to occur in abdominal veins—the "abdominal pool.") The patient is said to bleed into his own vessels.

In most cases both agencies operate in various degrees from the first to cause this state of bulbo-cardiac collapse. In all cases both are immediately at work to maintain and aggravate the vicious circle of reciprocally acting depressed metabolism and depressed function. The entire body is, of course, affected. For first-aid purposes only the heart and medulla need be considered.

The first object of treatment is at once to break this vicious circle and to start a corresponding beneficent circle by directing all possible available blood into the medullary and coronary circulations. For this purpose no single immediate measure can equal elevation for its combination of these features. In application it is simple, easy, instant; its effects are rapid and obvious; it permits of the simultaneous use of other measures; it can be applied in practically any circumstances provided the patient be on his back. Hence it can be used where the patient is found, during transport, at first-aid post, in hospital. The only other measure that can be equally quickly applied is pressure at a wound. This can stop the loss of blood but not improve the functional use of that which is left in the body. Both measures can usually be applied together.

With the body supine and the blood pressure low vertical elevation of a limb rapidly renders it also almost exsanguine, not alone by gravity but also, as Lister showed, by reflex contraction of its arteries. The displaced blood enters the trunk veins, thoracic or abdominal according to the limb concerned. Elevation of the lower trunk pours much of its contained blood into the inferior vena cava. Thus maximal elevation of the lower trunk and the limbs will cause most of the available blood quickly to enter the right heart and so to raise the intracardiac blood pressure. In response the right ventricle drives more blood through the lungs into the left heart, which in turn acts more powerfully, thus improving the blood flow through the heart muscle and the medulla, and that at a higher blood pressure in them. The "beneficent" circle is started. The improvement in the pulse, respiration, and colour is almost immediately perceptible.

In cases of severe haemorrhage this procedure makes the best use of the remaining blood, pending intravenous transfusion at hospital. In cases of "pure" shock it brings blood from the capillary "trap" into the improving circulation, and so the patient who has bled into his own vessels is now transfused with his own blood.

The degree, the extent, the duration of the elevation will depend upon the needs of the case and the help available. Single-handed a first-aider, standing beside the patient, can raise both legs by the ankles, and then, stepping astride the patient's head, can, by pulling on them, raise the lower trunk. This very tiring manœuvre is so rapidly effective that the pelvis can be lowered within, probably, a minute. Continued elevation of the legs is fairly easy. Two first-aiders, one on each side of the patient, can raise all four limbs and the pelvis. The effect of such elevation is usually dramatically rapid and plain to see. Thenceforward elevation may be reduced. Its further degree and duration must be a matter of judgment in the individual case while transport is awaited and carried out.—I am, etc.,

Watford, July 2. R. K. HOWAT, F.R.C.S.

Treatment of Head Injuries in War

SIR,—Prof. Hugh Cairns's timely review of the treatment of head injuries in war (June 22, p. 1029) raises many important points. He notes that the prophylactic value of the sulphonamides may allow of an extension of the waiting period before operation on a head injury is carried out. This is an observation of the utmost value, as it is well known that patients with head injuries travel well before operation, but that after operation it is desirable to retain such patients for a period of two or three weeks in clearing hospitals before evacuation if satisfactory results are to be obtained. It is preferable, therefore, in order to avoid congestion in the clearing hospital, to evacuate these patients to a base hospital before operation provided that speedy evacuation is possible, so that retention for the minimum period may be ensured.

I had the privilege of working with the late Sir Henry Gray and with the late Prof. Harvey Cushing in casualty clearing stations on the Western Front during the war of 1914–18, and my experience suggests the following practical points. Treatment should be preceded by a neurological examination, including ophthalmoscopy, and by the taking of radiographs, preferably stereoscopic, in order to determine the presence of a foreign body or of indriven fragments of bone. The scalp should be completely shaved and the skin cleansed. This can be done by an orderly, and a preliminary injection of morphine may be desirable. Under local anaesthesia the scalp wound should be excised and, if necessary, extended by a triradiate incision. The opening in the skull should be enlarged by means of nibbling forceps. Damage to the inner table is always more extensive than to the outer table. Ragged edges of dura mater should be cut away. Cushing, writing in the *British Journal of Surgery* (1918, **5**, 558), stated:

> "By the aid of alternate irrigation and suction by means of a Dakin's syringe through a soft flexible catheter inserted in the track the clots and devitalized brain substance are painstakingly removed. The fragments of bone detected by the catheter are picked out by delicate forceps and the projectile in as many cases as possible is extracted by the magnet. In short, the same principles of débridement utilized so successfully for wounds elsewhere have in their essentials been adapted to wounds involving the brain."

Other helpful procedures are the use of Cushing's clips for the arrest of bleeding from the vessels in the dura, and the use of a graft of temporal or other muscle to patch tears of the larger sinuses. Diathermy is valuable but not always available. Closure of the scalp wound is effected by freeing flaps so that the gap in the dura is covered. Drainage of the actual track in the brain is not an advantage, but a small slip of rubber dam may be inserted down to the dural opening for forty-eight hours. Such procedures can be carried out in a reasonably equipped operating theatre by a general surgeon.—I am, etc.,

Dundee, July 3. R. CHARLES ALEXANDER.

SIR,—I should like to supplement the memorandum by Prof. Hugh Cairns (June 22, p. 1029). Sir Victor Horsley, in Alexandria, made big skull wounds and left the dura open. The resulting hernia was not easily controlled and difficult to

dress. Prof. Harvey Cushing, on the contrary, in a C.C.S. during the Passchendaele battle of 1917 took every precaution to re-cover the brain with dura, pericranium, and skin flaps. Both surgeons used a copious flow of warm saline on the brain during the débridement. As anaesthetist to Sir Victor I never saw him pack a brain wound, and sharing the head surgery with Prof. Cushing packs were only used temporarily while muscle flaps were cut for haemostasis.

My case notes of that period are fairly complete for the Passchendaele battle and subsequently at Doullens, and Carrel-Dakin tubes, bipp, and fomentations appear regularly in the treatment. My impression of the past is that a general surgeon operating thoroughly on head cases in a C.C.S. area can save lives after the most surprisingly severe head wounds.—I am, etc.,

VALENTINE H. BLAKE,
Senior Surgeon, Great Yarmouth Hospital;
Late Capt. R.A.M.C. (i/c Mobile Team 48, C.C.S., B.E.F.).

July 3.

Wounds from Bomb Fragments

SIR,—To those of us who have had experience of gunshot and missile wounds in the last war it may come as a surprise that in the present war we are dealing with a form of missile which in many features is quite different from those with which we are all too familiar. I have recently had occasion to deal with bombing casualties where two salvos of high-explosive bombs were dropped from a height of roughly 3,000 feet. From a surgical point of view the bombs had this character, that they are contained in a thin-walled case which, on explosion, either by design or by accident, ruptures into a series of flat square fragments of about the diameter of a halfpenny and less—not more—and of rather less at their corner where they are torn off from the rest of the casing. The shape of these fragments is such that they travel at terrific speed and have imparted to them a rotatory movement comparable to that of flat stones thrown on to the surface of water. Furthermore, they have imparted to them so much heat that they are incandescent, and though they are not incendiary bombs in the technical sense they have all the effects of an incendiary fragment in flight. So much is this the case that fragments of this sort, after perforating corrugated iron doors, travelled a distance of about sixty yards and there ignited structures which required the immediate attention of the fire-fighting services. A missile of this type, by virtue of its shape and motion, is liable to inflict damage out of all proportion to its size, but, on the other hand, if no lethal injury is inflicted, by reason of its shape and circular-saw action it is much less likely to carry into the wound fragments of clothing, and by reason of its intense heat it is almost certain to sterilize its pathway through the clothing and tissues.

The wounds which I saw certainly gave one this impression, as they were clean-cut and gaping, and the edges charred and burnt. One of the injured was admitted to hospital with multiple wounds of this character, but the major wound was on the left side of the chest. It was a large gaping wound over the eighth rib in the mid-axillary line, and had the appearance of being caused by a large fragment of metal. Omentum was protruding from the wound, and it was obvious that he was the victim of a grave abdomino-thoracic injury. He died three hours after admission, and did not show any sign of improvement to justify active intervention. On post-mortem examination it was found that the fragment had cut through the eighth rib and perforated the diaphragm, in which there was a large hole through which was herniated the omentum and a part of the stomach wall. There was a large quantity of blood in the pleural cavity, but none in the abdomen. Nevertheless, there was a large rent in the anterior wall of the stomach, about three inches long and as clean as if it had been cut with a knife. Leading up from this there was a second large rent in the diaphragm, and the missile, a small square flat piece of metal such as I have described, was found embedded in the base of the lung. It was difficult to believe that such a small piece of metal could have inflicted so much damage. Incidentally, all the injuries inflicted were above the level of the knee-joint, and the marks of the fragments on the buildings confirmed the wisdom of the instruction to lie down flat during air raids.—I am, etc.,

July 8. HUGH C. WILSON.

Anastomosis Tubes for Resection of Colon

SIR,—Mr. Norman Lake in his description of an ingenious apparatus designed to establish continuity of the lumen of the bowel by the destructive agency of pressure (June 29, p. 1052) refers to the difficulty and danger associated with the use of other clamps designed to the same end. It is further represented that open operation involving the peritoneal cavity, advised by some surgeons as the method of choice, is the only alternative to breaching the bowel by crushing. In these circumstances the search for better and safer clamps would rightly be pursued intensively and achievement would be a matter for congratulation.

It is curious that the position now stated has not altered from that which was the subject of correspondence in the *Lancet* (March 24, 1917) during the last war twenty-three years ago. The letters from Professor Sinclair White and myself were at one in the support of extraperitoneal anastomosis by direct suture as described by Greig-Smith. Sinclair White cited thirty consecutive cases without failure or fatality. I have continued to use the method exclusively, and although unable to state the number of cases, success has been unbroken without even serious complication. Unshakable prejudice has frequently opposed persuasion, but where results have been followed or trial made the sceptic has been confounded and converted so that he at least would pardon Sinclair White "for expressing the conviction that enterotomes and similar contrivances should be relegated to surgical instrument museums."

The advocates of the crushing technique make no mention of consequent herniation, which is, I suggest, by no means uncommon. Complete reconstitution of the abdominal wall is an integral part of the extraperitoneal method and adds to its safety and success a further claim to favourable consideration.—I am, etc.,

London, W.1, July 5. PERCIVAL P. COLE.

Volkmann's Ischaemic Contracture

SIR,—All surgeons treating injuries in children should be grateful to Messrs. E. Bell Jones (June 29, p. 1053) and L. W. Plewes (June 29, p. 1054) for their admirable reports of two cases of impending ischaemia following elbow fractures. Their operative findings, which support my own observations based upon thirty-two cases, gave added weight to the theory that the primary lesion in Volkmann's contracture is an injury to the brachial artery with consequent spasm of the vessel itself and of its branches and collaterals. This view has been stressed in many recent French papers. My own observations, which were given as a Hunterian Lecture to the Royal College of Surgeons on February 2, 1940, are in the hands of publishers, but I feel that I can lose no time in disagreeing with Mr. Bell Jones's statement that "surgical intervention directed to the arteries does not contribute to a favourable termination of the circulatory changes in Volkmann's ischaemia." Indeed, I regard the recovery of his patient as solely due to the liberation and denervation of the artery. The interval before the improvement in his patient's circulation is not unusual after peri-arterial stripping. May I emphasize that all recent work urges that there is no place for "expectancy with judicious freedom of the elbow flexure" in a case which is *seriously* threatened with ischaemia, just as there is now no basis for the old theory of venous occlusion as the cause of the condition. Although this letter must be brief, I would like to point out that Garber's inferences from the case treated in the Fracture Service of the Manchester Royal Infirmary do not agree in the slightest with the conclusions which I have drawn from that patient's lesion. I reduced that particular fracture myself, and I was present at the operation, which clearly demonstrated an acute arterial block and no other vascular lesion. This matter is dealt with fully in the paper which I hope will be published shortly.

Mr. Plewes is on far safer ground and is to be congratulated on an important observation which will, I hope, help to save many limbs from this crippling condition.—I am, etc.,

Manchester, July 3. D. LL. GRIFFITHS, F.R.C.S.

Mobility of Pancreatic Tumours

SIR,—Pancreatic conditions, apart from a cyst, rarely give rise to a tumour of a size capable of detection by the clinician. In consequence pancreatic swellings are infrequently encountered by any individual, and their clinical features as described in the textbooks may be open to doubt. It is usually taught that a pancreatic tumour is immobile. I maintain that this is incorrect. The normal pancreas from its retroperitoneal position and anatomical relations is unlikely to have any considerable range of movement. But if the pancreas is enlarged it certainly gives rise to a tumour which is moved by the normal respiratory excursions of the diaphragm and liver. The first case of pancreatic cyst which I ever saw impressed me by the degree of mobility, when I had been given to believe that it should have been otherwise.

During the past two months I have seen two further cases in which the pancreas was palpable (and in the second case visible), and there was no question about the mobility. The first was a case of pancreatitis and the second of carcinoma of the body of the pancreas. In neither disease had I previously found the pancreas sufficiently enlarged to be palpable. A brief description of the cases will explain them.

1. A married woman aged 67 was complaining of some flatulent dyspepsia and a burning pain in the pit of the stomach. She had had a negative barium meal, and the radiologist during the examination had found a swelling in the epigastrium. Clinically the case was unlike a malignant condition, and crossing the epigastrium was an indefinite tumour transmitting aortic pulsation. Had it not been that with light touch the tumour was felt to move under the hand with respiration one could have considered the findings akin to the epigastrium of a thin ptotic woman. But she was neither ptotic nor thin. She was not jaundiced, but showed excess of fat in the stools. Laparotomy revealed a pathological gall-bladder with enlargement of the pancreas, which, though firm, exhibited normal lobulations. I had no doubt that the condition was chronic pancreatitis. The lump was not easy to feel (one day it seemed more easily detected than on another), but it had not escaped the palpation of the radiologist.

2. A married woman aged 64 was thoroughly investigated about Christmas, 1939, by a physician consequent upon loss of weight and mild dyspepsia. No disease of the alimentary and associated tracts could be found. The loss in weight increased. Slight diarrhoea developed, and three weeks ago she was sent by her doctor to a physician because a lump was now palpable in the left epigastrium. Further radiological investigations of alimentary tract and gall-bladder proving negative, an exploration of the abdomen was advised. The patient was a thin woman with a visible lump in the left half of the epigastrium. On respiration the lump moved with an excursion as great as that found in a neoplasm of the stomach. Had the recent barium meal not been normal one could have passed the mass as a carcinoma of the body of the stomach. To palpation it was stony hard. It was felt that it must be the pancreas, and laparotomy revealed a malignant growth involving the body and tail of the pancreas with small metastases in the liver.

In recording the above facts I think no doubt can now remain that pancreatic tumours display considerable mobility.—I am, etc.,

Sheffield, June 29. H. BLACOW YATES.

Medical Aspects of Workmen's Compensation

SIR,—I have perused with much interest your article (June 29, p. 1060) and the B.M.A. evidence before the Royal Commission on June 21 (*Supplement*, June 29, p. 103). I think most medical men will agree that the system of medical referees, as at present, is unsatisfactory, and will fully agree with the recommendation that it should be replaced by a properly constituted medical board. It is also important that the members, especially the chairman, of this board should be well versed in the industrial processes and hazards, as well as have medical knowledge. It has always appeared to me essential for medical men, reporting as specialists on these cases, to have an intimate, up-to-date knowledge of the technical, mechanical, and other factors of the work carried on by the workman. This is particularly the case in my special branch of the Workmen's Compensation Act—namely, dermatology, involving occupational dermatitis—where the nature of the work and the substances used or contacted in doing it—both often of a most complex and frequently changing variety—may have a bearing on the cause as well as the particular job the workman may, or may not, be allowed to do after recovery from dermatitis once contracted. It is found by experience, for example, that an occupational dermatitis contracted from a certain irritant may start again after recovery by contact with other potential irritants; in other words, occupational dermatitis is not absolutely specific to the original causal factor. Also many workmen who normally suffer from predisposition to skin trouble—for example, xerodermia or ichthyosis—should not be allowed to undertake certain work for fear of dermatitis resulting.

I have been amazed at the often lamentably small knowledge of various industrial processes and the substances used in them possessed by the average medical man, but I do think that those who have to issue medical reports on these cases should take every opportunity to see the actual work involved. I know that it is often most annoying to, say, a golfer to have to give up an afternoon's golf for a similar time watching the much more complicated job of the manufacture of golf hose, but I can assure him that the time so spent will not be wasted, and that we, as doctors, can often learn a lot of very useful things from industrial undertakings. Personally I always make it the rule, when in any doubt as to the exact nature of the job done by the patient in a suspected case of occupational dermatitis, to visit the works concerned; then, when issuing my report, whether the diagnosis is confirmed or otherwise, I add that "I have personally been to see and investigate the process concerned." This statement should, and apparently does, carry a little more weight with it than the mere statement of medical examination and findings.

And now just one point that you do not appear to have mentioned—namely, it always seems very unjust that any workman who wishes to claim compensation for an industrial injury must go to a certifying factory surgeon and at his own expense of five shillings get a certificate from him. Surely this is adding a five-shilling insult to injury in many instances. I have come across cases in which the sum, so necessary to secure justice, could not be spared from the meagre financial family resources, and the patient did not belong to any trade union (who will always willingly come to their members' aid in such instances), and what was a just claim has been allowed to lapse. The patient, often a youth, has just had to leave off that particular job and get another one.

There are very many more aspects of workmen's compensation that one might discourse upon. Incidentally, why should hospitals receive money under the Road Traffic Act for the treatment of persons injured on the roads, while persons injured in industry requiring their aid are not so helped but are treated free? Surely both types of patient are comparable.—I am, etc.,

F. A. E. SILCOCK, M.D., D.P.H.,

July 4. Hon. Dermatologist, Leicester Royal Infirmary.

Economics of Consultant Practice in Wartime

SIR,—There are two important points to which I would like to draw the attention of readers and which have a national as well as a professional importance.

1. The voluntary hospitals, as at present constituted, depend for their continued efficient existence on the gratuitous services of their expert staff. It gives a certain standing to be on the honorary staff of a voluntary hospital, and the professional standing of the staff and the size and level of efficiency of the hospital are interdependent. If the hospital is sufficiently good the specialists and surgeons, and to a less extent the physicians, are enabled to practise as consultants only and not to engage in general practice. But already in certain areas of this country the private practices of the consultants have vanished and they are left with the gratuitous part only. So far the military authorities have housed the

sick and wounded troops in civilian hospitals, and troops are sent to out-patient clinics for an expert consultant's opinion. This consultation, for which the ordinary fee in private practice is three guineas, costs the Government 6d. For an in-patient soldier the State pays 1s. 6d. per night to be shared among the honorary medical staff. And when all the expert work is done the soldier, quite rightly, will be moved to convalesce in a safer area at the same rate of payment. Moreover, if at any time there are no sick or wounded military sick in the hospital the staff are expected to remain available, but no retaining fee of any kind is paid. Contrast this with the cost of maintaining a fully equipped military base hospital, with a staff of full-time, paid medical officers even if the hospital is empty. The financial saving is so great that any administrative inefficiency can be overlooked. The professional efficiency will depend on those, in any area, generally recognized by their colleagues as being of such merit that in the past they have earned a living as consultants. But how long can the consultants continue to work gratuitously on civilians, for a pittance on soldiers, and to stand by for military emergencies without any recompense? How long, especially in those areas where private practice is dead but where these services are most likely to be needed?

2. My second point is the position of a doctor's dependants if he is killed by enemy action. Contrast the following hypothetical examples; I have made them as extreme as possible to illustrate fully the situation.

(*a*) A surgeon of the highest qualifications and experience attached to a voluntary hospital is killed by a bomb while returning from operating on military wounded in a civil hospital. (*b*) A comparatively recently qualified and inexperienced R.A.M.C. officer attached to a regiment or depot in England, whose work is light and not of a responsible nature, since he sends all difficult cases to hospital, while returning from dancing at a hotel is killed by a bomb. These are extreme examples, but what about the case of the honorary surgeon to a civil hospital whose health breaks down as the result of strain compared with a similar illness in the case of a temporary R.A.M.C. officer? It might be said that the medical profession must stand the same risks as the rest of the population, but this is not a true appreciation of the problem. For I do not know of any other *essential service* of an army carried out by civilians under conditions of great strain and even danger at rates of pay only a fraction of that paid to military officers for similar services and who in addition receive board, lodging, and service. How are dependants of the civil surgeons going to be treated compared with those of the military? I hope that this point is already covered and that our anxieties for those dependent on us are to be mitigated by adequate provision.

I think it will be agreed that these two fundamental points must ultimately gravely affect the efficiency of the professional service available. The spirit is willing but the household expenses high!—I am, etc.,

Hove, June 28. H. J. MCCURRICH, M.S., F.R.C.S.

PS.—Since this letter was written defence areas have been considerably extended and therefore more of the profession are involved.—H. J. McC.

T.A.B. Vaccine in Gonorrhoea

SIR,—Referring to Dr. A. H. Bartley's letter (June 29, p. 1070) on the effects of T.A.B. vaccine in gonorrhoea, I should like to point out its good results in *acute* gonorrhoeal joint disease. When M.O. i/c of a section of Chiseldon Military (V.D.) Hospital in 1919, cases of acute synovitis, chiefly affecting the knee-joint, came under my care. To give a typical case: I saw a patient about 7 p.m. who was very restless and clearly in severe pain, with a tensely swollen and extremely tender knee-joint. Temperature was 104°. After attending to the joint locally I gave him an intravenous injection of one drachm of T.A.B. vaccine—a large dose. On my next morning's visit, about 10.30 a.m., I learnt that he had passed a very restless night with some delirium, that his temperature had risen above 105°, but that now all the swelling, tenderness, and temperature had disappeared and he could flex his knee without any pain or discomfort. He had no recrudescence of his joint trouble. The effect of this treatment seemed really wonderful in these *acute* cases; the treatment is not so effective in chronic ones.—I am, etc.,

Acocks Green, Birmingham, July 1. E. T. LARKAM.

Retropulsion of the Nucleus Pulposus

SIR,—In the *Journal* of November 25, 1939 (p. 1038), I made a plea for more careful consideration of new procedures before their adoption, using laminectomy for retropulsed nucleus pulposus as an example. In a letter which you published on May 18, 1940, Profs. Mixter, Ayer, and Barr attacked this article, accusing me of confusing, in my consideration of their end-results, the cervical cases with the lumbar or "sciatica" cases. The most important and instructive case is, however, a "sciatica" case. This is Case 19 of their first series (Mixter and Barr, 1934, *New Engl. J. Med.*, **211**, 210). Case 19 had pain down the left thigh posteriorly. In spite of a negative lipiodol examination, a lumbo-sacral laminectomy was performed. The unfortunate woman died of a wound infection. This case is referred to in the second paper, but is ignored in the third (that of Barr), reappears in the fourth and fifth papers, but in the sixth paper Barr states: "There have been two deaths in our series: both of these had severe irreparable nerve damage from large ruptured disks" (Barr, *B.M.J.*, 1938, **2**, 1251). There is no mention of wound infection. I feel that I am entitled to ask, Did Prof. Barr forget this case of post-operative death, or has he selected his cases for his end-results? In my article I gave chapter and verse for my statements, and, armed with the relevant articles, you, Sir, and your readers can obtain the truth of the matter in dispute.—I am, etc.,

Hatfield, July 5. SIDNEY PAPPWORTH.

Corrigendum

We regret that owing to a misinterpretation the second reference in the last paragraph of Dr. E. A. Pask's letter in last week's issue (July 6, p. 31) was incorrect. This reference should have been to the article by R. R. Macintosh and F. B. Pratt in *Modern Anaesthetic Practice* (Practitioner Handbook Series), 1938, p. 55.

Obituary

L. G. J. MACKEY, M.D., F.R.C.P.

Physician, Queen Elizabeth Hospital, Birmingham

In the sudden death on June 27 of Dr. Leonard G. J. Mackey Birmingham loses one of its most prominent and popular physicians, who from the outset of his career closely identified himself with the branch of clinical bacteriology in which he deservedly built up a very high reputation for himself all over the Midlands. A student of the Birmingham School of Medicine, he was attached to the staff of the Queen's Hospital and later became its senior physician. During this time he was very largely responsible for the negotiations which resulted in the amalgamation of the two hospitals, the General and the Queen's, into what was then called the United Hospital—a change long needed both in the service of the school and in the service of the city. This change enabled the project of the building of the New Centre Hospital, afterwards named the Queen Elizabeth Hospital, to be proceeded with. Dr. Mackey was a prominent member of the building committee from its initiation, and was intimately associated with the preliminary investigations and subsequent transactions associated with the building. He was one of its first physicians.

Mr. Frank Barnes writes:

A man of untiring energy, an enthusiastic believer in the realm of clinical bacteriology in medicine in which he con-

ducted the most extensive practice in the Midlands, Mackey nevertheless established a widespread reputation as a consulting physician as a man of sound judgment, and if in his practice he might appear to be unorthodox it was never without soundly argued reasons. His patients were his personal care, and no trouble was too great for him where his services were required. He will be widely mourned by a very large circle of friends and patients. As a teacher in the school he was extremely popular and a great clinical diagnostician. He would stamp the features of the case on the memory of the students by some quaint or witty observation which his pupils never forgot, and no external attractions either of work or play tempted him into neglecting those hours with them, which he looked upon as an essential part of his life and duty.

He was an ardent sportsman, and many of the most enjoyable holidays I have ever had were those spent in his company salmon fishing. Unlike most sportsmen, the loss of a fish at the end of a strenuous battle never caused him the slightest regret. "Good luck to him," he would say; "he deserves to get off; he made a great fight." He took to shooting comparatively late in life and characteristically became master of the mechanics of the gun, not merely of the art of shooting, and just in the same way, after he had become reasonably expert at golf, he developed his own theory as to the distribution of weight in the head of the club. Thoroughness was his great characteristic. He was an acknowledged authority on antiques and especially those associated with ecclesiastical furniture, where his opinion was frequently sought. Indeed, prior to and even during his student days he had spent some years in London and Paris studying that subject. His death occurred quite unexpectedly with no previous warnings of ill-health. He was taken ill in his car driving home after tea and was seen by a doctor friend to be in difficulties and to whom he diagnosed his trouble as a subarachnoid haemorrhage. He died twenty minutes or so after reaching his home. He was a great friend and will be sorely missed.

The following well-known foreign medical men have died: Dr. JAMES ROBERTS, formerly president of the International Association of Health Officers and vice-president of the American Public Health Association, aged 64; Dr. WILHELM STEKEL, the Vienna psycho-analyst and sexologist, aged 74; and Dr. GEORGE ALDER BLUMER, formerly editor of the *American Journal of Psychiatry*, president of the American Medico-Psychological Association, and honorary member of the Royal Medico-Psychological Association of Great Britain, aged 82.

The Services

ROYAL NAVY: MENTIONS IN DISPATCHES

Surgeon Commander A. Craig, R.N., has been mentioned in dispatches for good services when one of His Majesty's ships was damaged by a bomb, and Temporary Surgeon Lieut. (probationary) R. H. Roberts, R.N.V.R. (H.M.S. *Furious*) for good services when a French destroyer was burnt out.

AWARDS TO THE B.E.F.

Military Cross

Lieut. James Clark Walker, R.A.M.C.

Lieut. Walker worked unceasingly all day and night on May 22-3 tending wounded who were pouring into Boulogne, with complete disregard for his personal safety, although bombs and shells were falling in the immediate vicinity. He also evacuated wounded across the bridge at Boulogne, which was under rifle and light automatic fire. He finally left Boulogne on the last destroyer on May 24.

By a printer's error the award to Surgeon Lieut. R. A. Du Val, R.N.V.R., was recorded as D.F.C. in this column last week (p. 34) instead of *D.S.C.*

CASUALTIES IN THE MEDICAL SERVICES

ROYAL NAVY

Surgeon Lieut.-Commander HUGH ADARE LOCKHART, R.N.V.R., is reported as missing presumed killed in action in H.M.S. *Glorious*. He was the elder son of the late Dr. and Mrs. R. A. Lockhart of Prudhoe-on-Tyne and was educated at the University of Durham, where he graduated M.B., B.S. in 1932.

ROYAL ARMY MEDICAL CORPS

Major ROBERT BRYSON RUTHERFORD, *M.C.*, who has died of wounds, was educated at the University of Edinburgh, where he graduated M.B., Ch.B. in 1912. Dr. Rutherford was in practice at Sheffield before the war and was a medical examiner of recruits in that zone before rejoining the R.A.M.C. for service. He had held the posts of resident medical officer at Sheffield Royal Infirmary and house-surgeon at the Jessop Hospital for Women, Sheffield. He was medical officer to the Sheffield Post Office and had been a member of the British Medical Association since 1919. He served in the war of 1914–18, won the Military Cross, and rose to the rank of major.

Wounded

Acting Captain Albert Edwin Jowett, R.A.M.C.
Lieut. Richard Kendall Pilcher, R.A.M.C.

Universities and Colleges

UNIVERSITY OF CAMBRIDGE

The following medical degrees have been conferred:

M.D.—C. Hardwick, R. E. Rodgers, *J. S. Richardson.
M.B., B.CHIR.—*A. M. Stevens.

* By proxy.

UNIVERSITY OF LONDON

The Principal's Report

Mr. Herbert L. Eason in his report as Principal on the academic year 1939–40 states that when in September last the crisis resolved itself into war the plans previously made for the organization of the University in the emergency were carried out; the majority of the Schools moved from London and the Senate decided that the central administrative staff should also leave London. He then gives a short account of the dispersal of the Schools of the University and the reasons for this dispersal. Speaking generally, the work of the University continued satisfactorily, though the temporary arrangements have thrown much additional work on the teaching and administrative staffs of the Schools and of the University itself. Examinations have been held under conditions arranged to meet the altered circumstances and there has been no breakdown and no lowering of the usual university standard. The Principal records that the late Sir Edmund Davis bequeathed to the University, after life interests, the residue of his estate for the foundation of scholarships in medicine, law, and engineering, for the benefit particularly of students from Northern and Southern Rhodesia. The Duke of Bedford has given to the Middlesex Hospital Medical School stock to the value of £2,660 to endow a fellowship in medical radiology in memory of the Duchess of Bedford, who worked as a trained radiologist during the last war. The roll of internal students reading for degrees and diplomas of the University now comprises 10,965 names, including 3,707 in the faculty of medicine. The title of Professor Emeritus has been conferred on Dr. T. R. Elliott, F.R.S., who was director of the Medical Unit of University College Hospital Medical School and held the university title of Professor of Medicine from 1920 to 1939.

UNIVERSITY OF MANCHESTER

The following candidates have satisfied the examiners at the examinations indicated:

M.D.—H. J. Brennan (with commendation), G. B. Carter, B. Hirsh, F. Janus, V. F. Lambert, H. L. Settle, C. Verity.

FINAL M.B., CH.B.—*Part II*: Eva Abrahamson, A. Ashworth, J. H. R. Barker, F. R. Brebner-Smith, J. B. Brownlie, E. F. Burndred, G. Caplan, Rachel Claiman, Hilary J. Crewe, A. C. C. Davey, Elisabeth J. Davy, W. Dickson, J. W. Emerson, G. R. Ferguson, J. G. Ferguson, †E. S. Frazer, R. J. Campbell, J. Gregory, Hilda R. Harris, †H. Hassall, S. Haythornthwaite, B. L. Hoffmann, Irene E. Howorth, †O. Janus, E. W. Jones, G. Lancaster, J. T. A. Lloyd, J. L. Maclean, Elsie L. Mettam, ‡C. Parish, K. C. Prausnitz, †T. F. Redman, W. E. Rigby, *F. Robinson, Margaret H. Roscoe, J. C. Seddon, J. K. Steward, A. L. Tulk, Ena M. Walmsley, Elizabeth C. S. Williams, Joyce Worthington. *Part I (Forensic Medicine and Hygiene and Preventive Medicine)*: E. P. Abson, R. G. Balf, J. Ball, J. K. Brown, B. O. Dowdell, Jeanne M. Edwards, E. L. Feinmann, J. C. Greenwood, P. G. Griffiths, E. G. Hall, Frances A. Hepburn, S. H. Jackson, R. P. Jepson, J. D. Johnson, H. Khazam, N. A. Lewtas, D. C. Little, J. K. McMyn, F. S. Mooney, A. B. Morrison, T. E. Parry,

S. S. Rose, Susanne M. Seligsohn, G. J. Shanklin, H. G. B. Slack, J. Thompson, D. H. M. Titcombe, Vera Waine, F. R. Wilde, L. Wise, B. Wilman, P. B. Woolley.

D.P.H.—*Part II*: Beryl A. Barlow, H. Boardman, C. Conway, Violet Conway, C. D. Cormac, G. N. Kowshik, N. Levy, H. Rahman, L. Rich, Mary A. Rogerson.

* Second-class Honours. † Distinction in Medicine. ‡ Distinction in Surgery.

ROYAL COLLEGE OF SURGEONS OF ENGLAND

Annual Report of the Council

Owing to the necessity for economy in paper the Council regrets that the Annual Report cannot be supplied to all those whose names are on the regular list for posting in October, but it must restrict the circulation of this year's report to those Fellows and Members who apply to the Secretary by August 1, 1940.

Election to the Council

On July 4 four Fellows were elected into the Council to fill the vacancies caused by the retirement in rotation of Sir Alfred Webb-Johnson and Mr. G. Gordon-Taylor, by the death of Mr. Wilfred Trotter, and the resignation of Sir Charles Gordon-Watson. The result of the poll was as follows:

	Votes
GORDON GORDON-TAYLOR (Middlesex)	775
Sir ALFRED EDWARD WEBB-JOHNSON (Middlesex) ..	610
HARRY PLATT (Manchester)	500
VINCENT ZACHARY COPE (St. Mary's)	419
Reginald Martin Vick (St. Bartholomew's)	390
Robert John McNeill Love (Royal Northern)	376
Ernest Frederick Finch (Sheffield)	350
Sir Lancelot Barrington-Ward (Great Ormond Street)	276
Edward Kenneth Martin (University College Hospital)	183
Norman Claudius Lake (Charing Cross)	146
Edward Gustave Slesinger (Guy's)	122

In all 1,301 Fellows voted; in addition six votes were found to be invalid. Mr. Gordon-Taylor, Sir Alfred Webb-Johnson, and Mr. Harry Platt are all elected for the full period of eight years, and Mr. Zachary Cope acts as substitute member for Sir Charles Gordon-Watson until July, 1941.

Medical Notes in Parliament

Medicines and the Purchase Tax

Clause 17 of the Purchase Tax Bill deals with goods exempt from the tax, as set out in the Fourth Schedule of the Bill. It provides that the Treasury shall have power to alter this Schedule from time to time by Order, subject to the approval of the House of Commons. The Treasury may also from time to time more closely define the goods which are to be taken as falling within any class of goods specified in the Fourth Schedule.

By the Third Schedule to the Bill the making up of drugs according to a formula prescribed by reference to the needs of a particular person, or the selling of drugs so made up for use by the person in question, shall not be deemed to be manufacturing—that is, making goods with a view to the selling of the goods by the person making them, or processing for sale.

By the Fourth Schedule the classes of goods exempt from the Purchase Tax include food, water, fuel, electricity, gas, ambulances, "medical and surgical appliances, and essential drugs being appliances or drugs of an exceptionally costly character," and spirits including methylated spirits and methyl alcohol purified so as to be potable.

The making and selling of any goods by a dentist as such or by a dental mechanic as such is not to be deemed manufacture.

Doctors in Coastal Areas

Mr. Malcolm MacDonald was asked on July 4 by Sir A. HARBORD if, owing to the evacuation scheme in operation on the East Coast and to serious decline in work in consequence, he would consider giving preference to doctors thrown out of work thereby to enter the Services or for appointments to wartime posts. Mr. MACDONALD replied that he would do so. He said a number of doctors normally practising in the towns involved were being given appointments in the Emergency Medical Service. A circular was recently issued on the subject. In addition, the Central Medical War Committee was giving preference to other doctors in these towns in submitting names to the Service Departments for such vacancies as existed in their medical branches.

Treatment of Air Raid Casualties

Sir ERNEST GRAHAM-LITTLE on July 4 asked Mr. MacDonald to revise the official scheme for dealing with air raid casualties in view of the fact that this scheme was planned in peacetime before any experience was available of the nature of the injuries. Sir Ernest said the most experienced surgical opinion condemned more particularly the arrangements proposed for the collection, classification, and disposal of the injured persons at the time of injury when it was especially imperative to secure the most highly skilled professional attention available. Mr. MACDONALD answered that although improvements were continually being effected in the Emergency Hospital Scheme, he did not think experience up to date warranted any change in the main conception of the scheme, which had the approval of medical and surgical opinion generally. It was designed to secure the most highly skilled professional attention for the greatest possible number of casualties at the earliest possible moment.

Income Limit for Health Insurance

Mr. RHYS DAVIES asked the Minister of Health on July 4 whether in view of the proposal to increase to £420 the present limit of £250 per annum for the unemployment insurance of non-manual workers he would introduce legislation to amend the Health Insurance Scheme likewise. Mr. MACDONALD replied that the raising of the limit to £420 a year for unemployment insurance would not necessarily involve a similar change for national health insurance, but the matter was receiving his consideration.

Health of Munition Workers Committee

On July 9 Mr. BEVIN stated that the work of the Health of Munition Workers Committee, which was dissolved before the end of the last war, had been largely continued and developed by the Factory Department of the Home Office, now transferred to the Ministry of Labour, and by the Industrial Health Research Board of the Medical Research Council. Both of these bodies had issued, in the light of subsequent developments and research, more up-to-date pamphlets and other publications on matters dealt with by the committee. While some of the findings and recommendations were common knowledge, and a number of them had been implemented by legislative action, many were no longer appropriate. The relevant conclusions had already been brought to the notice of the Factory and Welfare Advisory Board.

Quality of Milk under Government Schemes.—On July 9 Miss HORSBRUGH told Mr. D. Adams that the Minister of Health had received a letter from the medical officer of health for Newcastle-on-Tyne protesting against the omission from the cheap milk scheme of the power whereby the source and quality of the milk supplied must be approved by the medical officer of health of the welfare authority. The Minister of Food found it impracticable to impose in connexion with a national scheme any condition of the kind suggested. It was, however, open to any local authority, in addition to exercising its powers under the Food and Drugs Act, to give advice either through welfare centres or otherwise to expectant and nursing mothers and children with regard to the choice and use of milk supplied under the national milk scheme.

Notes in Brief

Arrangements are in force in all evacuation areas whereby expectant mothers who wish to do so may register for evacuation under the Government Scheme. A number of women in the later stages of pregnancy are already being sent out at frequent intervals from London and other towns, and facilities are ready for much larger numbers.

EPIDEMIOLOGICAL NOTES

Infectious Diseases for the Week

The four commonest acute infectious diseases in this country—measles, whooping-cough, diphtheria, and scarlet fever—all show some increase during the week; of the less frequent diseases, enteric fever, dysentery, acute poliomyelitis, and cerebrospinal fever also advanced, the last named rather unexpectedly, as a general decline was recorded in recent weeks. Moreover, increases were recorded in London and in all four countries with the exception of Northern Ireland, where the number remained at 7. Notifications of acute poliomyelitis were more than double those of the previous week, exactly double those of the corresponding week last year, and six times those of 1938, when this country was visited by its first large-scale epidemic. It is assumed that the recent weather may be a factor in this unduly early incidence of a disease usually associated with the late summer and autumn months.

Some alarm is natural at the large increase and widespread distribution of the enteric fevers, even though the great majority of attacks are of paratyphoid B infections. This is reflected in the low case mortality: 1 in London and 1 in the rest of England and Wales; some allowance, however, must be made for the lag between notification and death—usually 10 to 14 days, but it may be longer. In the last four weeks notifications have been 39, 59, 77, and 205, and the disease has spread from 17 to 26 administrative areas in the week under review.

Some three-quarters of the cases were recorded in six counties—namely, Durham 38 (Consett U.D. 35, Easington R.D. 3); Essex 22 (Barking M.B. 5, Billericay U.D. 1, Clacton U.D. 1, Dagenham M.B. 2, Hornchurch U.D. 5, Ilford M.B. 4, Leyton M.B. 1, Romford M.B. 3); Gloucester 14, all in Bristol; London 16 (Shoreditch 3, Deptford and Stoke Newington 2 each, Fulham, Greenwich, Hackney, Islington, Kensington, Lambeth, Poplar, Stepney, and Wandsworth, all 1 each); Middlesex 10 (Acton M.B. 1, Edmonton M.B. 3, Enfield U.D. 2, Hendon M.B. 1, Southgate M.B. 1, Wood Green M.B. 2); Northampton 55 (Corby U.D. 3, Higham Ferrers M.B. 5, Kettering M.B. 26, R.D. 4, Raunds U.D. 1, Rushden 7, Wellingborough U.D. 7, R.D. 1, Oundle and Thrapston R.D. 1). The available evidence points to some article or articles of food contaminated by those who prepare or handle food; the possible part played by wholesale distributing houses and the new arrangements for the distribution of food made necessary by rationing are being carefully examined, but no details are yet available.

Paratyphoid in Northamptonshire

Dr. C. M. SMITH, County Medical Officer of Health for Northamptonshire, sends a preliminary note on the outbreak of paratyphoid fever in that county:

The recent epidemic of paratyphoid B now seems to have subsided. The outbreak has comprised a total of 68 cases, of which 37 were in Kettering Borough, 8 in Wellingborough Urban District, 8 in Rushden Urban District, and the remainder in Higham Ferrers Borough, the Urban Districts of Raunds and Corby, and the Rural Districts of Kettering, Wellingborough, and Oundle and Thrapston. Apart from three patients who were taken ill at the end of May and during the first few days of June, the main force of the epidemic was experienced between about June 5 and 17. The epidemiological evidence points to the infection having been due to consumption of cakes, scones, bread, etc., from one source. As regards the age and sex distribution, only three children under 5 were affected, while there were nineteen patients of school age, and the remainder were adults. The sex distribution is of interest in so far as there were forty females against twenty-eight males. The cases were generally fairly mild, but some patients had moderately sharp attacks. A few cases showed symptoms resembling meningitis, and in point of fact at least two patients were at first suspected to be suffering from cerebrospinal fever. Rose spots were fairly common. So far only three secondary cases have been reported. The patients are now all progressing favourably, and it seems almost certain that there will be no deaths.

No. 25

INFECTIOUS DISEASES AND VITAL STATISTICS

We print below a summary of Infectious Diseases and Vital Statistics in the British Isles during the week ended June 22, 1940.

Figures of Principal Notifiable Diseases for the week and those for the corresponding week last year, for: (a) England and Wales (London included), (b) London (administrative county), (c) Scotland, (d) Eire, (e) Northern Ireland.

Figures of Births and Deaths, and of Deaths recorded under each infectious disease, are for: (a) The 125 great towns in England and Wales (including London), (b) London (administrative county), (c) The 16 principal towns in Scotland, (d) The 13 principal towns in Eire, (e) The 10 principal towns in Northern Ireland.

A dash — denotes no cases; a blank space denotes disease not notifiable or no return available.

Disease	1940 (a)	(b)	(c)	(d)	(e)	1939 (Corresponding Week) (a)	(b)	(c)	(d)	(e)
Cerebrospinal fever	264	23	68	2	7	20	3	2	2	2
Deaths		2	3				—	—		
Diphtheria	735	30	193	23	31	783	89	187	26	15
Deaths	22	1	8	2	1	13	1	3	3	1
Dysentery	51	2	29	—	—	43	21	32	—	—
Deaths			—	—	—			1	—	—
Encephalitis lethargica, acute	3	—	1	1	—	3	2	2	1	—
Deaths		1	3				1	1		
Enteric (typhoid and paratyphoid) fever	205	16	1	6	2	54	2	7	7	1
Deaths	2	1	—	—	—	—	—	—	1	—
Erysipelas		17	37	6	3		32	65	3	2
Deaths		—	—				1	—		
Infective enteritis or diarrhoea under 2 years										
Deaths	25	3	8	5	5	35	7	5	6	6
Measles*	9,366	30	1,954		27		41	105		4
Deaths	4	—	12	2	—	7	—	—	1	—
Ophthalmia neonatorum	81	6	23		1	87	10	23		—
Deaths										
Pneumonia, influenzal†	444	17	6	1	2	520	41	1	2	9
Deaths (from influenza)	12	1	—	1	1	8	1	2	1	2
Pneumonia, primary			163	5				145	5	
Deaths‡		21		7	6		4		8	8
Polio-encephalitis, acute	4	—				—	—			
Deaths		—					—			
Poliomyelitis, acute	24	—	—	—	—	12	1	—	—	—
Deaths		—	—				—	—		
Puerperal fever	3	3	11	4	—	7	7	15	—	—
Deaths		—					—			
Puerperal pyrexia	124	18	18		—	179	16	14		—
Deaths										
Relapsing fever	—	—			—	—	—			—
Deaths										
Scarlet fever	884	32	116	48	68	1,597	162	233	33	71
Deaths	—	—	—	—	—	3	—	1	1	—
Small-pox	—	—	—		—	—	—	—		—
Deaths	—	—	—	—			—	—	—	—
Typhus fever	—	—	—	1	—	—	—	—	—	—
Deaths			—	—	—			—	—	—
Whooping-cough*	720	3	58		11		316	155		8
Deaths	3	—	4	1	—	12	3	11	1	1
Deaths (0-1 year)	277	30	65	30	19	251	36	54	35	18
Infant mortality rate (per 1,000 live births)						40	32			
Deaths (excluding still-births)	3,983	616	572	210	126	3,793	655	557	196	125
Annual death rate (per 1,000 persons living)			11.6	14.0	11.0	9.3	8.4	11.3	13.2	11.0
Live births	6,296	983	886	418	270	6,609	1,096	939	336	264
Annual rate per 1,000 persons living			17.9	27.9	23.7	16.2	14.1	19.0	22.6	23.2
Stillbirths	220	27	40			231	38	39		
Rate per 1,000 total births (including stillborn)			43			34	34	40		

* Made notifiable generally on November 1, 1939.

† Includes primary form in figures for England and Wales, London (administrative county), and Northern Ireland.

‡ Since January 1, 1940, figures for London (b) have been for deaths from all forms of pneumonia; the corresponding figures for 1939 relate to deaths from lobar pneumonia only.

Medical News

The Paddington Medical Society has arranged a special meeting for Tuesday next, July 16, at 9 p.m., in the Boardroom of St. Mary's Hospital, to discuss "The Place of Medical Services in Wartime."

At the annual meeting of the Royal Society of Medicine on July 2 the following officers were elected for the session 1940–1: President, A. M. H. Gray, M.D. Honorary Secretaries: Ida Mann, F.R.C.S., L. R. Broster, M.Ch. Honorary Treasurers: C. W. Gordon Bryan, F.R.C.S., E. A. Cockayne, M.D. Honorary Librarians: J. D. Rolleston, M.D., E. K. Martin, M.S. Honorary Editors: Alan Moncrieff, M.D., R. Davies-Colley, M.Ch.

In a circular to local authorities the Ministry of Health has asked that there should be made available to refugees from Holland and Belgium the facilities provided for maternal and child welfare and for the treatment of tuberculosis, venereal and infectious diseases.

According to the *British Australian and New Zealander*, a Maori woman said to be 114 years of age took part in the recent centenarian procession near New Plymouth, New Zealand. She retains all her faculties.

Mr. Edward F. Linstead, F.C.S., after forty-five years' service with Burroughs Wellcome and Co., has retired from his position as manager of the Advertisement Department which he formed in 1895 under the direction of the late Sir Henry Wellcome.

Letters, Notes, and Answers

All communications in regard to editorial business should be addressed to THE EDITOR, BRITISH MEDICAL JOURNAL, B.M.A. HOUSE, TAVISTOCK SQUARE, W.C.1.

ORIGINAL ARTICLES and LETTERS forwarded for publication are understood to be offered to the *British Medical Journal* alone unless the contrary be stated.

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The TELEPHONE NUMBER of the British Medical Association and the *British Medical Journal* is EUSTON 2111.

The TELEGRAPHIC ADDRESSES are
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SECRETARY, *Medisecra Westcent, London.*

The address of the B.M.A. Scottish Office is 7, Drumsheugh Gardens, Edinburgh.

QUERIES AND ANSWERS

Freshly Ground Whole-wheat Bread

Dr. J. BARCROFT ANDERSON writes: Sir Robert McCarrison (June 15, p. 984) places first in his items needed for the "best diet" "freshly ground whole-wheat . . . bread." Other scientists who have studied this question agree that to get the best value out of a ground grain it must be cooked, freshly ground. They know that some vital element rapidly disappears from the meal after grinding. We hear much of the value of whole-wheat bread, but little of the need that it should be freshly ground. Now it is not possible to buy in London whole-meal bread or biscuit, guaranteed to have been baked within a few hours of grinding. Neither is it possible to buy retail good clean wheat. Were such obtainable it could be ground in its entirety in the home, in a steel cone coffee mill, and at once baked. Can you suggest any way by which the private householder, or the mobilized troops, could obtain this known essential ingredient of "the best diet," freshly ground whole-wheat bread?

LETTERS, NOTES, ETC.

The Medical Directory, 1941

Messrs. J. and A. CHURCHILL Ltd. (104, Gloucester Place, Portman Square, W.1) write: To maintain the accuracy of our annual volume, the *Medical Directory*, we rely upon the return of our schedule, which has been posted to each member of the medical profession. Should the schedule have been lost or mislaid we will gladly forward a duplicate upon request. The full names of the doctor should be sent for identification.

Salvage of Paper

"G. T." makes the following suggestion to fellow members who would like to take their share in relieving the present acute shortage of paper. "Any of your readers who are inclined to hoard back numbers of medical periodicals might perhaps be sufficiently considerate to see that they are handed over to the salvage people. Only the other day I happened to be in the rooms of a medical man, and I could not help noticing piles of professional journals stacked up under a bookcase, where they are unlikely to be looked at again from year's end to year's end. In my own case I always cut out what I require for permanent filing and the rest of the journal is sent away with other scrap paper."

Synthetic Radio-elements

Surgeon Rear-Admiral CHARLES M. BEADNELL (Surrey) writes: I am grateful to Mr. R. E. Pattle (June 22, p. 1036) for pointing out two errors in my letter (June 1, p. 911). Fluorine $^{19}_{9}F$ should have been described as transmuting into radio-nitrogen $^{16}_{7}N$ *and* radio-oxygen $^{19}_{8}O$; while $^{17}_{8}O$ ought to have been alluded to as an end-product consisting of the very rare isotope of oxygen. But is Mr. Pattle absolutely confident in the correctness of his statement that no "nuclear disintegration [has] yet been produced by electrons"? Recent research has provided direct evidence of electrons with energies amounting to 10^{13} to 10^{14} electron-volts as contrasted with the relatively moderate 3×10^{4} e.vs. of beta-particle electrons. The mere fact that in a cloud chamber the track of one of these high-energy electrons is indistinguishable from that of a proton—which is an effective breaker of nuclei—is surely an indication that the former do effect nuclear disintegration. H. J. Braddick in the section of his *Cosmic Rays and Mesotrons* that deals with the number of heavy particles produced at different levels in the atmosphere by the components of cosmic rays writes: "It therefore seems probable that these particles arise from nuclear disintegration by electrons or light quanta, and this view is supported by the observation of Anderson and Neddermeyer that the particles are often associated with electronic showers."

Ginger-pop for CO Poisoning

Dr. IRENE N. CLOUGH (Glasgow) writes: Recently I was called in to attend two workmen overcome with coal-gas while working on the mains of an empty house. The notable feature of their recovery was that brandy and whisky were both at hand, were offered and firmly refused by both men (one an Irishman and one a Scot!). "Stone ginger," they said, was the approved remedy in these cases, and one of their comrades had already sent for a bottle. "It gets the gas up," they explained. Stone ginger-beer proved to be a valuable remedy, not only because it "got up the gas"—of which they were both unpleasantly full—but also, I suppose, because the CO_2 gas stimulates breathing. An engineering friend, who was gassed with carbon monoxide, says that he was greatly relieved by soda-water. The men apologized profusely for going against a medical opinion, while quite rightly holding to their own.

Acute Appendicitis in a Baby

Dr. M. C. ANDREWS writes: I have just seen in your issue of May 4 (p. 730) Dr. E. L. Loewenthal's account of appendicitis in a baby. I remember seeing a child aged 14 months who was brought to the out-patient department of the Royal Alexandra Hospital, Brighton, with a temperature of 101° F. There was tenderness in the right iliac fossa. I diagnosed appendicitis, and when Mr. J. Griffiths operated two hours later a clearly defined appendix abscess was found. The patient made a successful recovery. I do not remember hearing of a case in which this diagnosis was made ante mortem in a younger child.

We are asked to state that patients admitted to Nuffield House are not restricted to the professional services of the medical and surgical staff of Guy's Hospital, but may be under the care, subject to the approval of the superintendent of the hospital, of any person of consultant rank.